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DVI Broadcaster DL™ User Guide

Epiphan Technical Documentation

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February 2013

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- Your DVI Broadcaster DL serial number.
- The behavior of your DVI Broadcaster DL LED indicators.
- Technical description of the signal source including resolution, refresh rate, synchronization, type of hardware.
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2 Overview

2.1 Introduction

The Epiphan DVI Broadcaster DL is an external device designed for **streaming** and/or **recording** the video content from one connected source and optionally the audio from one connected audio source. Its DVI In port can support any of the following video sources:

- DVI (either single link or dual link)

- HDMI

- Other compatible sources with appropriate adapters and/or converters (e.g. Thunderbolt, DisplayPort, and mini DisplayPort)

This compact external device captures DVI or HDMI video signals in resolutions up to 2048x2048 or2560x1600 for widescreen applications. The DVI Broadcaster DL then streams the captured content in compatible formats allowing the broadcast to be viewed with standard internet browsers and media players.

The DVI Broadcaster DL is an Ethernet network device that can be automatically configured to connect to networks that support DHCP addressing or it can be manually configured to use static IP addressing to connect to the network. It supports a 100Mbps Ethernet connection. For more advanced users, the DVI Broadcaster DL can also be configured prior to connecting it to the network. This is done by connecting a workstation directly to the DVI Broadcaster DL using its Ethernet port.

Upon connecting to an Ethernet network, the DVI Broadcaster DL can be configured and operated through an easy to use web-based administration interface.

Once properly configured, the DVI Broadcaster DL device can broadcast the video source and the optional audio source over a wired Ethernet cable connected to the network.

Viewers are simply provided with a URL in order to watch the desired broadcast stream. Additionally, the DVI Broadcaster DL allows content producers to also record the broadcast to .AVI or .MOV formatted files.

The Epiphan DVI Broadcaster DL comes with a 4 GB internal solid-state memory for recording broadcasts which provides buffering such that in the event the network is experiencing slow transfer rates, no captured data will be lost. In addition to this

built in flash storage, recorded video files can be archived to a network storage device such as a FTP server or copied to an inserted USB flash drive.

The DVI Broadcaster DL can support streaming over HTTP, RTSP, peer-to-peer RTP connection, multicast RTP and a Content Distribution Network (CDN) broadcast network. The decision on how to stream a broadcast will depend on the answers to the following questions as well as other design decisions. What is the number of expected viewers? How are the viewers going to stream the broadcast? What are the network capabilities on the broadcast side and on the viewer side? Should a Content Distribution Network be used? For further details on broadcasting strategies, please refer to **Streaming**.

3 Physical Attributes

3.1 System Hardware Features

The DVI Broadcaster DL device is a 202mmx105mmx35mm (7.95”x4.13”x1.38”) unit.

Figure 1 Rear View of the DVI Broadcaster DL

Below is a table summarizing the connectors and indicators found on the rear panel of the DVI Broadcaster DL.

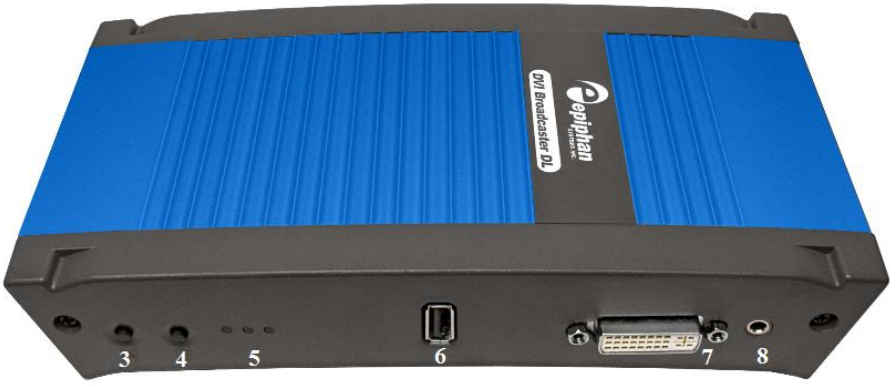
Table 1 ***Summary of the Rear Panel's connectors and Indicators***

Number	Name	Description
1	USB	USB 2.0 port that also supports USB 1.1 and RS-232

		port functionality. You are enabled to integrate the DVI Broadcaster DL with other equipment featuring an RS-232 port and control your device over the RS-232 connection. Please refer to **Serial Port Configuring**.
2	RJ45 Ethernet	Primary RJ-45 Ethernet network port to connect the DVI Broadcaster DL device to an Ethernet network. The DVI Broadcaster DL device Ethernet port is auto-sensing.

The front panel is illustrated below.

Figure 2 Front View of the DVI Broadcaster DL



Below is a chart detailing the connectors found on the front panel.

*Table 2 **Summary of Connectors on the Front Panel***

Number	Connector	Description
3	Factory Reset Button	Resets the DVI Broadcaster DL back to its factory configuration defaults. In order to avoid accidentally resetting the device, a special sequence is required: • disconnect power to the device, • press and hold the Reset button as you reconnect the power. • the blue LED lights up.

		• keep pressing the Reset button until the blue LED turns off and the green LED lights up. • release the Reset button.
4	Record Stop/Start Toggle	**Record on/off**: toggles the recording on/off status.
5	LEDs	**Red LED:** During operation the red LED blinks each time the DVI Broadcaster DL captures an image. The red LED can be used as an indicator that the DVI Broadcaster DL is capturing images. When the input signal(s) stop(s) sending images, the red LED stops blinking. **Green and blue LEDs**: When the DVI Broadcaster DL device first starts up, the blue LED lights up. A few seconds later the green LED lights up. After about another 20 seconds the blue LED turns off, leaving the green LED on indicating that the DVI Broadcaster DL has started up and can start capturing images. During operation the blue LED blinks during video signal test operation and when the system tunes video parameters. **Blue LED:** The blue LED blinks to indicate that the DVI Broadcaster DL is recording received images. If the files are not being recorded, the blue LED remains off. Note: Sometimes it may take more than 20 minutes to power up the device. During this time the blue LED is on and the green LED is blinking. It means that the Check disk function started automatically when the device powered up.
6	USB port	This is an additional USB expansion port as described above.
7	DVI In	Connect the incoming video source to the DVI Broadcaster DL. For DVI video input, connect using the included DVI cable. To connect unencrypted HDMI video input, use the included HDMI to DVI adapter. For other types of video sources use the appropriate adapters and connectors to allow the video source to be connected to the DVI input port. These adapter and connectors are not included with the DVI Broadcaster DL.
8	Audio In	Connect a microphone to broadcast an audio stream.

3.2 Cables, Connectors and Adapters

The DVI Broadcaster DL can be connected to a number of different types of equipment using a variety of cables, and adapters. This section describes a subset of connectors, cables and adapters that are known to be compatible with the DVI Broadcaster DL.

3.2.1 3.5 mm Mini-jack

A 3.5mm mini jack connector is used to carry audio signals. It can be connected to DVI Broadcaster DL to its Audio In port.

Figure 3 3.5mm Mini-jack

3.2.2 DVI to DVI Cable

Connects a DVI source to the DVI Broadcaster DL's DVI port. This cable is included with the DVI Broadcaster DL.

Figure 4 DVI to DVI Cable

3.2.3 HDMI to DVI Adapter

Connects an HDMI source to either of the DVI Broadcaster DL's DVI ports. This adapter is included with the DVI Broadcaster DL.

Figure 5 HDMI to DVI Adapter

3.2.4 RJ-45 Male

Connects the DVI Broadcaster DL to an Ethernet network.

Figure 6 RJ-45 Male Cable

3.2.5 *Power over Ethernet (PoE) Injector*

The DVI Broadcaster DL incorporates a Power over Ethernet (PoE) technology. PoE delivers both data and electrical power to an Ethernet enabled device using a single Ethernet cable. This eliminates the need for the DVI Broadcaster DL to be situated close to a power outlet. This allows more freedom in its placement.

PoE injectors supply or inject direct current (DC) power through network cables to power network devices.

4 Getting Started

4.1 Supplying Power to the DVI Broadcaster DL

To provide power to the DVI Broadcaster DL, plug the provided PoE adapter into a 10/100Base-T Ethernet network using an Ethernet cable. This network must be running the TCP/IP protocol.

If your network does not provide Power over Ethernet, connect the DVI Broadcaster DL to an AC power outlet with the PoE adapter/injector connected to an Ethernet cable and plugged into the DVI Broadcaster DL's RJ45 Ethernet port.

Regardless of the power source once connected, the DVI Broadcaster DL now powers up. Its power and activity LEDs will now light up following their start up sequence.

4.2 Confirm Input Signal is Received

Confirming that the input signal is being received by the DVI Broadcaster DL can be done once the DVI Broadcaster DL has been powered on and the input source has been started.

First, check that the DVI Broadcaster DL's red LED is blinking. A blinking LED indicates that the DVI Broadcaster DL is capturing images. If the red LED does not start flashing, check the input source to ensure that it is transmitting a signal. Additionally, check that a cable from the input source to the DVI Broadcaster DL is connected correctly.

Note that you can check whether the DVI Broadcaster DL is transmitting an audio signal only in a live stream or when you open a recorded file.

4.3 Network Connections

Please to refer to the Networking chapter for the instructions on direct DVI Broadcaster DL's connection to the Ethernet, discovering the DVI Broadcaster DL on the network, IP address settings and other details.

4.4 Logging into the Web Admin Interface

The Web admin Interface is accessible by logging into it using one of the following methods.

4.4.1 Access through Service Discovery

The simplest way to access Web Admin interface of your DVI Broadcaster DL in the local network is to type the following string in the address bar of your web browser:

<serial>.local

where <serial> is the serial number of your DVI Broadcaster DL.

For example: **http://92185.local**

To access the device as described the following conditions should be met depending on your OS:

Microsoft Windows – install either Safari or iTunes on your workstation.
MacOS X – Bonjour software which is used for service discovery comes built-in with Mac OS. Therefore DVI Broadcaster DL device can be accessed without any additional installations.
Linux – the Avahi implementation used for service discovery is shipped with most Linux distributions. Therefore most probably your device will be accessed without any additional installations. However you are recommended to address your administrator for the details first.

4.4.2 Epiphan's Network Discovery Utility.

The Epiphan Network Discovery Utility can be installed and executed from a workstation running Windows XP, Vista or Windows 7. Follow the following steps to access the Web admin Interface through this utility:

1. Start the Epiphan Network Discovery Utility tool.

2. Click **Search** to find all of the Epiphan devices on the network and select the desired DVI Broadcaster DL.
3. Click **Web config.**
4. A web browser starts and you are prompted for the DVI Broadcaster DL's administrator user name and password.
5. Enter the following information:
   User Name: **admin**
   Password: *configured password*<return>, there is no default password so unless a password has been configured, just hit <return>

The Web admin interface opens.

Alternatively the Network Discovery Utility can be used to retrieve the DVI Broadcaster DL's IP address and access to the Web admin Interface will be done using a browser.

4.4.3 Logging into the Web Admin Interface Using a Web Browser and the IP Address of the DVI Broadcaster DL

The web browser can be running on Windows, Mac OS X, Linux or any other operating system.

1. Start a web browser on any workstation connected to the same network as the DVI Broadcaster DL.
2. Browse to the DVI Broadcaster DL.
   http://<ip address of the DVI Broadcaster DL>/admin
   The IP address of the DVI Broadcaster DL can be obtained using any of the following methods:
   a. The Epiphan Network Utility
   b. The EpiphanTouch app
   c. From the network administrator
   d. Using the Factory Default static IP address. Only if the steps in section, Connecting Directly to the DVI Broadcaster DL, are followed
3. Log in as the DVI Broadcaster DL's administrator user
   User Name: **admin**
   Password: *configured password*<return>, there is no factory default password so unless a password has been configured, just hit <return>

The Web admin Interface opens.

4.5 Users Logging

The DVI Broadcaster DL comes with three pre-configured users which are used to log in the control interface. The first is the administrator user, its user name is **admin.** The second is the operator user, its user name is **operator**. The third is the viewer user, its user name is **viewer**. Each can be assigned a password but their user names cannot be altered. It is not possible to create new log in users. The user name is always displayed in the upper right corner of the interface.

4.5.1 The Administrator User

The administrator user is used to log into the DVI Broadcaster DL and perform any of the following functions:

1. Perform configuration changes to the DVI Broadcaster DL.
2. Manage the current broadcast. This can include the starting or stopping of the recording of the broadcast.
3. Manage previously recorded broadcasts. Including the archiving of recordings.
4. System monitoring. This would involve retrieving any system statuses and retrieving the solid state memory status.
5. **Upgrading the System Firmware** from Epiphan Support. New firmware is released to fix known problems or to add new features.

As a default factory setting, the administrator user does not come with a password but it is recommended that a password is configured as early as possible for security reasons.

4.5.2 The Operator User

The operator password is used to log in to manage broadcast recordings, configure audio and frame grabber settings, and access the recorded files.

As a default, the operator user does not come with a factory configured password. Configuring an operator password is optional.

4.5.3 The Viewer User

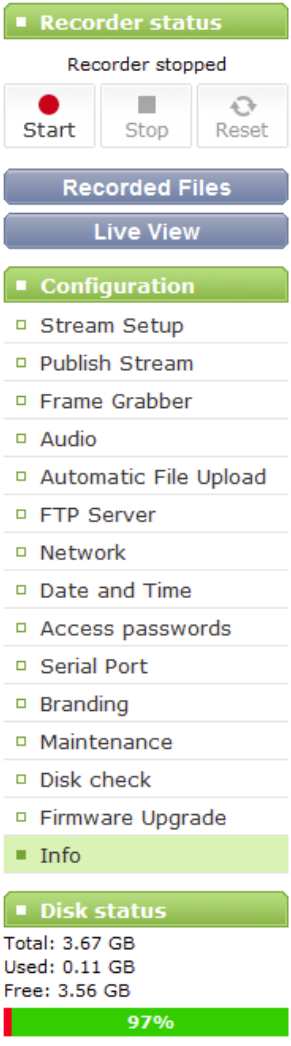
The viewer password is used to log in to view broadcasts and does not have any administrative ability.

As a default, the viewer user does not come with a factory configured password. Configuring a viewer password is optional.

4.6 Web Admin Interface

In this section you can see a diagram showing the Web admin Interface's main menu. It is located on the left side of the screen.

Figure 7 Web Admin Interface's Main Menu



The following table briefly describes each of the options on the Web admin Interface's main menu.

Table 3 ***Web admin Interface's Main Menu Options***

Stream Setup	Change the stream settings.
Publish Stream	Sends the stream to a remote streaming server such as a Content Distribution Network service provider (CDN) or Epiphan.tv portal
Frame Grabber	Make frame grabber image adjustments.
Audio	Change and adjust the audio input.
Automatic File Upload	Set up automatic files uploading from the DVI Broadcaster DL device to a network storage device.
FTP Server	Configure FTP access settings to connect to the DVI Broadcaster DL internal solid state memory using an FTP client and the administrator, operator or viewer account.
Network	Change the DVI Broadcaster DL network configuration.
Date and Time	Change DVI Broadcaster DL date and time settings.
Access passwords	Change the admin, viewer and operator account password.
Serial Port	Integrate the DVI Broadcaster DL with other equipment featuring an RS-232 port and control your device over the RS-232 connection.
Branding	Customize design of the browser where the broadcast is viewed.
Maintenance	Reboot or shut down the DVI Broadcaster DL device. Restore factory configuration.
Disk Check	Set a Maintenance Schedule for checking the DVI Broadcaster DL solid-state memory for errors.
Firmware Upgrade	Upgrade the DVI Broadcaster DL firmware.
Info	Display information about the DVI Broadcaster DL Firmware and hardware, broadcasting and recording status, available streams, input video signal.
Disk Status	View the total solid state memory in GB, the used and available hard solid state memory in GB, and also the amount used as a percentage of the total solid state memory.

5 Video Formats and Standards

The DVI Broadcaster DL supports broadcasting of various standards and formats. The choice of video format will depend on the broadcast content and performance requirements. For example, Motion JPEG does not support audio from an external source. It also depends on how the intended viewers are planning to receive and play the broadcast. Keep in mind that browser viewer capabilities and compatibilities are subject to change.

With the DVI Broadcaster DL, video codec for streaming is selected by an administrator. After this action the system creates a list of available streaming formats for this codec. Users can view the broadcast in any available format depending on their preference. Moreover, multiple users can view the same broadcast in different formats. The list of formats available for the selected combination of video and audio codecs displays on the Info page of the Web admin interface.

The DVI Broadcaster DL can stream video using Flash (H.264), ASF (MPEG4 or H.264 codecs), Motion JPEG or RTSP (MPEG4 or H.264 codecs). A quick definition of these video streaming methods and the type of application that a viewer would use to watch that particular video stream is now provided.

The **Adobe Flash Video file type** is proprietary but is supported on most web browsers and on many media players including the VLC Media Player. This file type supports the H.264 standard. This video supports analog audio from an external source.

The **Advanced System Format (ASF) file type** also called Advanced Streaming format, can be viewed with the Windows Media Player or the VLC Media Player. Additional codecs may need to be installed to view ASF files. This file type supports H.264 and MPEG4 standards. This video supports analog audio from an external source.

The **Motion JPEG file type** records each frame in the video in JPEG format and can be viewed using most web browsers. This video does not support analog audio from an external source.

The **RTSP type** supports many media players including QuickTime and MPlayer. This file type supports H.264 and MPEG4 standards. This video supports analog audio from an external source.

Note: Media Player, browser, viewer capabilities and compatibilities are subject to change.

6 Signal Capture

6.1 Connecting Input Sources

It is recommended that prior to powering up the DVI Broadcaster DL, the input source is connected first. This input source can be a DVI or HDMI source. Any one of these sources would be connected to the DVI Broadcaster DL using its DVI input port. Audio input will be connected to the DVI Broadcaster DL Audio in port.

6.1.1 Connecting DVI or HDMI Input Sources

All DVI or HDMI input sources are connected to the DVI Broadcaster DL using the DVI input port. How this connection is made and using which cable is dependent on the input source.

DVI input sources are connected using the DVI to DVI cable.

HDMI input sources are connected using the HDMI to DVI adapter. These sources should only be non-copy protected content.

Note that an HDMI signal containing audio will not be captured.

6.1.2 Connecting Audio Input Sources

All audio sources are connected to the DVI Broadcaster DL using the audio input port.

6.2 Frame Grabber Adjustments

A frame grabber is an electronic device that captures individual still frames from a digital video stream and transmits them in a digital form. An Epiphan frame grabber is a subsystem component in the DVI Broadcaster DL and can be configured separately. From the Web admin interface, select **Frame Grabber** from the main menu to configure Frame Grabber adjustments.

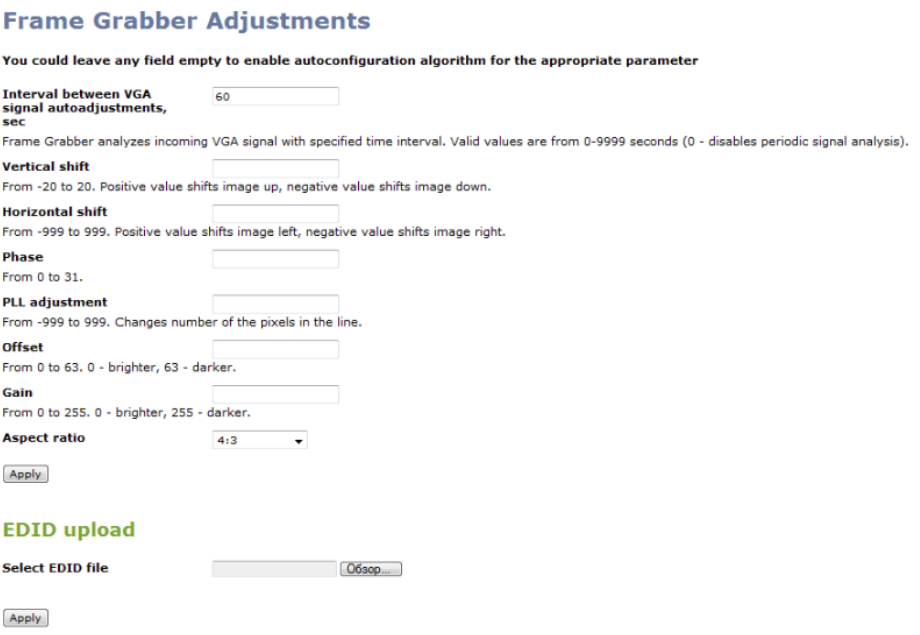
Normally, making manual image adjustments should not be necessary. This means that there are no default Frame Grabber adjustment settings. However, special requirements may exist that produce image quality problems that can only be fixed by making image adjustments.

The Frame Grabber adjustments page within the Web admin interface contains most of the information needed to make image adjustments. This includes a brief description of the effect created as a result of each adjustment and the adjustment range.

To make an adjustment, add a value to one or more fields and select **Apply**.

To clear any adjustments, delete the value from one or more fields and select **Apply**.

Figure 8 Frame Grabber Adjustments


Frame Grabber Adjustments
You could leave any field empty to enable autoconfiguration algorithm for the appropriate parameter
Interval between VGA signal autoadjustments, sec
60
Frame Grabber analyzes incoming VGA signal with specified time interval. Valid values are from 0-9999 seconds (0 - disables periodic signal analysis).
Vertical shift
From -20 to 20. Positive value shifts image up, negative value shifts image down.
Horizontal shift
From -999 to 999. Positive value shifts image left, negative value shifts image right.
Phase
From 0 to 31.
PLL adjustment
From -999 to 999. Changes number of the pixels in the line.
Offset
From 0 to 63. 0 - brighter, 63 - darker.
Gain
From 0 to 255. 0 - brighter, 255 - darker.
Aspect ratio
4:3
Apply
EDID upload
Select EDID file
Обзор...
Apply

The table below discusses all options found on the Frame Grabber Adjustment page.

Table 4 ***Frame Grabber Adjustment Options***

Interval between VGA signal autoadjustments, sec	Change the interval between automatic adjustments if you want them to occur more or less often. To suspend automatic adjustments, enter 0.
Vertical shift	Configure the vertical shift to offset the captured image's position. For example, a captured image that is shifted slightly downward or vertically can be corrected with minor adjustments to the vertical shift settings. Increasing or decreasing the value entered in the Vertical Shift field shifts the image up or down.
Horizontal shift	Configure the horizontal shift to offset the captured image's position. For example, a captured image that is shifted slightly to the right or horizontally can be corrected with minor adjustments to the horizontal shift settings. Increasing or decreasing the value entered in the Horizontal Shift field shifts the image to the right or left.
Phase	Not used.
PLL adjustment	Not used.
Offset	Not used.
Gain	Not used.
Aspect ratio	Not used.
Select EDID file	Browse to the Extended display identification data (EDID) file to be uploaded. EDID is the information about display's supported resolutions, timings, formats, chromacity, and other media parameters. This information can be used by a signal source for adaptation to the characteristics of a device accepting the signal. Use this URL to upload EDID files: http://www.epiphan.com/downloads/edid/

7 Stream Setup

When you log in to the control interface, in the Stream Setup section you can configure the video codec and specify streaming settings for the input signal.

7.1 Select Video Codec

Before starting the video recording or broadcasting process, you have to specify the video codec for encoding. It can be selected in the Stream Setup section of the interface.

To select the video codec:

1. Click the Stream Setup option.
2. Click an arrow in the **Codec** field.
3. Select the required codec from the drop-down list. The following values are available for selection:
   - H.264
   - MPEG4
   - Motion JPEG

After you have specified required video and audio codecs (as described in this section and in the **Select Audio Format** section), click the **Info** menu option of the Web Admin interface to see available broadcasting formats for your settings and obtain the IP addresses for the broadcast (refer to **Retrieving the Stream's URL for Broadcasting**).

Figure 9 ***Stream Settings***

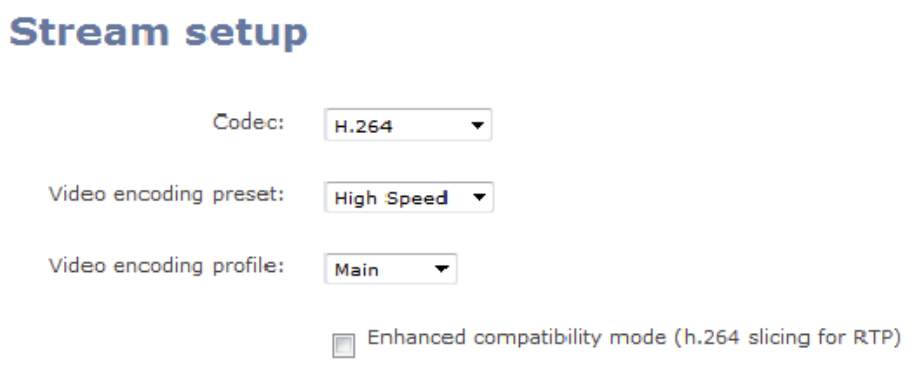


Table 5 ***Stream Setup settings***

Video encoding preset	Defines how a video stream should be encoded: - at a high quality - at a high speed - according to the default system settings.
Video encoding profile	Select one of the following encoding profiles that target specific classes of applications: 1. **Baseline**: for applications requiring additional data loss robustness, e.g. videoconferencing 2. **Main**: for standard-definition broadcasts 3. **High**: for broadcast and disc storage applications This parameter can be set for the H.264 codec only.
Enhanced compatibility mode (h.264 slicing for RTP)	This parameter provides operating stability if the transmitted video/audio stream is not quite supported by the viewer's equipment. When this parameter is activated, each picture is subdivided into one or more slices. The slice is given increased importance in H.264 as the basic spatial segment that is independent from its neighbours. Thus, errors or missing data from one slice cannot propagate to any other slice within the picture.

The following streaming settings can be made:

Figure 10 Streaming Settings

Below is a table showing the streaming settings that are configurable.

Table 6 ***Streaming settings***

Show time label	If the video needs to be time labeled or timestamped, this parameter allows how the date and time will be displayed. Click on **Show substitutions** and use the **Format substitutions** commands to select the desired date and time format. The commands are described in a table below. If time labeling is not required, leave this field blank.
Frame size	Select a frame size from the drop down list to limit the width and height of the video image. If the video source is sending resolutions larger than the resolution limit configured, the video image will be scaled to the resolution limit. Limiting the frame resolution can help to reduce bandwidth usage.
Key frame interval	Controls the number of frames. Key frames define the starting and ending points of any smooth transition.
Limit frame rate	Enter a value in terms frames per second. This field is used to set a frame rate that is lower than the maximum frame rate at which the DVI Broadcaster DL can capture images. Reducing the frame rate reduces the number of images being captured by the device. Decreasing the frame rate can help to reduce bandwidth usage.
Bitrate	Enter a DVI signal bitrate. A lower bitrate produces lower quality videos and smaller file sizes. A higher bitrate

	produces better quality videos and larger file sizes.
Quality parameter (for MJPEG only)	This parameter is similar to Bitrate. Use bigger values to improve the quality of the broadcast.

Table 7 ***Format Substitutions Commands***

Command	Value	Example (27/09/2012 10:50:45.378)
date	%F	2012-09-27
year	%G	2012
month (as **01**)	%m	09
month (as **Jan**)	%b	Sep
month (as **January**)	%B	September
day of month	%d	27
weekday (as **Thu**)	%a	Thu
weekday (as **Thursday**)	%A	Thursday
time	%T	10:50:45
hour	%k	10
minute	%M	50
second	%S	45
ms	%#m	378

7.2 Audio Configuration

Use the Audio section of the Web admin interface to configure the audio settings that control the audio input. All available video formats support audio except Motion JPEG.

Figure 11 Audio Configurable Options

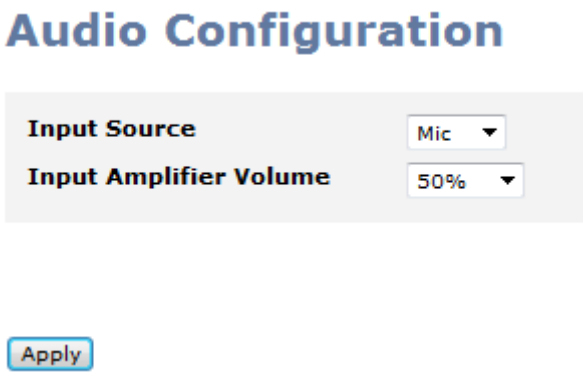


Table 8 ***Audio Configurable Options***

Input Source	Select the input source • Line • Mic (pre-amplified signal)
Input Amplifier Volume	Reduce the input volume if the line in signal volume is too high for the DVI Broadcaster DL line in amplifier. The default input amplifier volume setting is 30%. If the input volume is too high, change the setting to between 5% and 90% to reduce the input volume.

7.3 Set Video Encoding Constraints/Parameters

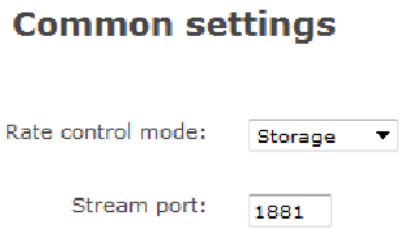
The following common parameters can be additionally specified:

Table 9 ***Common settings***

Rate control mode	Used for H.264 and MPEG4 codecs. It specifies the bitrate encoding for the signal. Select one of the following: - **Low Delay** Means Constant Bitrate Encoding (CBR) will be used. CBR is useful for streaming multimedia content on limited capacity channels since it is the maximum bit

	rate that matters, not the average. Therefore, CBR would be used to take advantage of all of the channel capacity. - **Storage** Means Variable Bitrate Encoding (VBR) will be used. This produces a better quality-to-space ratio compared to a CBR file of the same data. VBR files vary the amount of output data per time segment and the FPS value may be lower.
Stream port	The number of the port being used to stream the broadcast. This value would be used along with the URL to access the broadcast. In the case where there are two streams because Independent streaming is being used, this value remains the same for both of the URLs being used. In case of RTSP streaming this value is not considered.

Figure 12 Common Settings



The **Page refresh time** parameter in the MJPEG webpage section is available if the Motion JPEG codec is selected.

Page refresh time	Specify how often the browser updates the visual information coming from the DVI Broadcaster DL. In other words, how often the page is refreshed

7.4 Select Audio Format

The Audio settings pane in the control interface can be accessed by clicking the Stream Setup option from the menu. Select the **Enable audio** checkbox and specify the audio signal parameters.

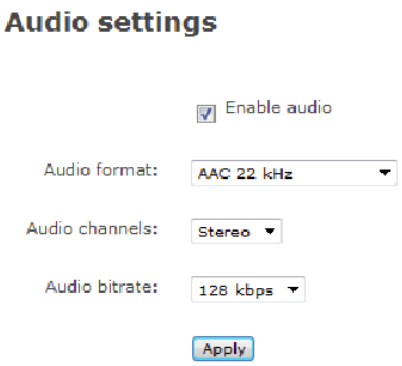
Table 10 ***Audio settings***

Enable audio	Select this checkbox to enable audio for the broadcast.

Audio format	You can select the following audio formats:
	• MP3 – a common audio format for consumer audio storage
	• Raw PCM (Pulse Code Modulation) – a standard form for digital audio in computers as well as other uses such as digital telephone systems
	• G.711 – an ITU-T standard for audio companding. It is a very commonly used waveform codec.
	  ○ μ-law is used primarily in North America
	  ○ A-law is in use in most other countries outside North America
	• AAC - a standardized, lossy compression and encoding scheme for digital audio. AAC generally achieves better sound quality than MP3 at similar bit rates.

Audio channels	Select either mono (1 channel) or stereo (2 channels) sound.
Audio bitrate	Select the audio bitrate value for the broadcast.

Figure 13 Audio Settings



8 Streaming

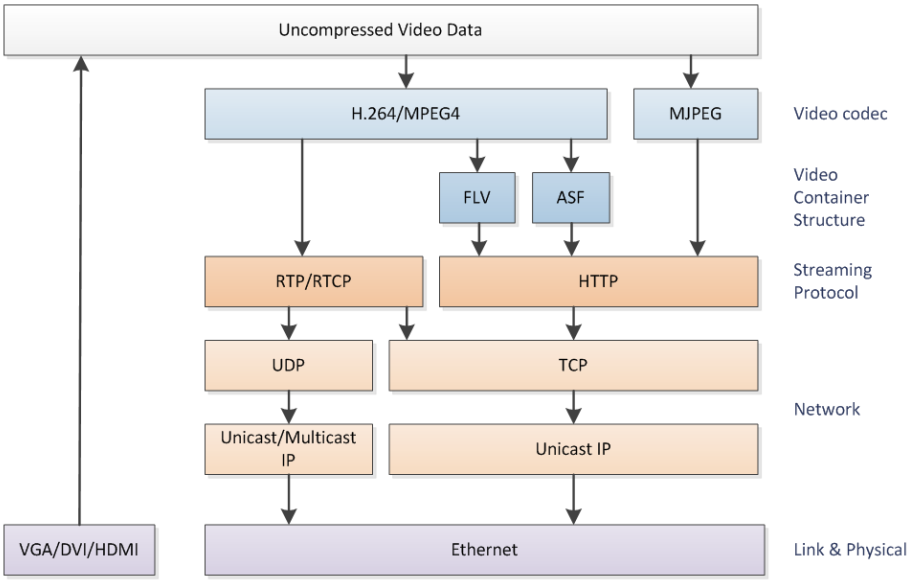
There are several decisions that need to be made when planning the creation of a broadcast, besides its exact content of the broadcast. Will the broadcast include an audio component coming from an analog audio source? What video format to use, what video standard to use, how to stream the broadcast are all questions that have to be answered when creating a broadcast. Most of the answers depend on the intended audience of the broadcast, how are the viewers going to view the broadcast, and how many simultaneous viewers are expected to view the broadcast? Where are the viewers located in relation to the where the broadcast is being streamed? What are the performance expectations? These are the types of questions that will determine the overall design of the broadcast.

This chapter outlines how a suitable design of a broadcast can be architected based on these types of questions and their resulting answers and how the System can be used in this design.

The DVI Broadcaster DL supports streaming of various standards and formats. The choice of video format will depend on the broadcast content and performance requirements. For example, Motion JPEG does not support audio from an external source. It also depends on how the intended viewers are planning to receive and play the broadcast. Keep in mind that browser viewer capabilities and compatibilities are subject to change.

With the DVI Broadcaster DL, video codec for streaming is selected by an administrator. After this action the system creates a list of available streaming formats for this codec. The figure below is representation of the protocol stack diagram showing how the video data is processed.

Figure 14 Protocol Stack Diagram



How the broadcast will be delivered to its viewers depends on the number of intended viewers and where the viewers are in relation to where the broadcast is originating. Are they on the same LAN or will they be accessing the broadcast from an external network? The answers to the above questions will help decide the delivery method of the broadcast.

The DVI Broadcaster DL can support streaming over HTTP, RTSP, peer-to-peer RTP connection, multicast RTP and a Content Distribution Network (CDN) broadcast network. Each broadcast delivery method will be now discussed in more detail.

8.1 HTTP or RTSP Streaming

For HTTP or RTSP streaming the only information required to view the broadcast is the URL of the broadcast. The DVI Broadcaster DL is ready to go straight out of the box, without any additional settings. If your broadcast needs to be accessed by many clients, use a Content Distribution Network as explained in the **Using a Content Distribution Network** section.

8.2 Using a Content Distribution Network

A content delivery network (CDN) is a system of computers or servers that ingest an incoming stream source and rapidly provides this content to numerous users by duplicating the content on multiple servers and directing the content to users.

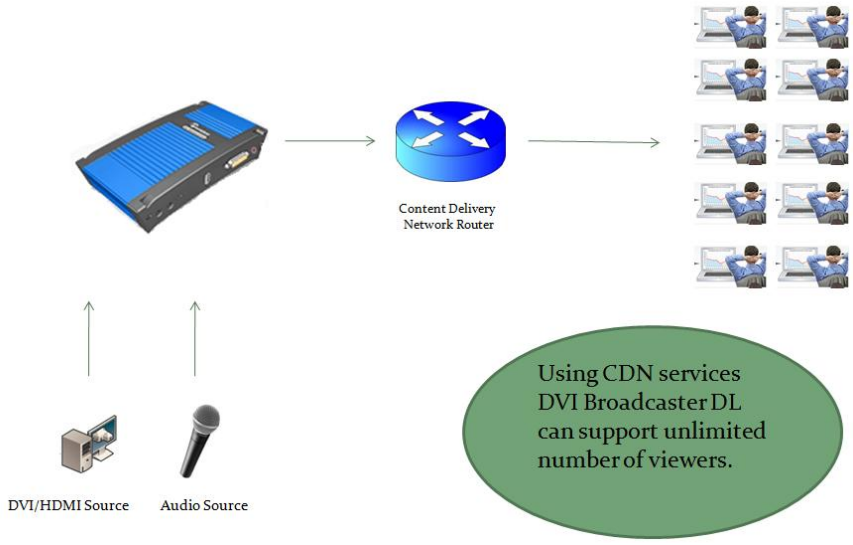
CDN distributes a heavy load of traffic to multiple locations in order to avoid congestion on a network that could impact a user's Internet experience. A CDN is highly scalable and can make financial sense to website owners as you will not need to pay for additional server hardware or routing should your website traffic start to increase or even decrease. The use of CDN technology has obvious advantages to those users whose broadcasts have large audiences from locations all over the world. If dozens or hundreds of viewers happen to select the same Web page or content simultaneously, the CDN sends the content to each of them without delay or time-out.

To stream to multiple users, the System can be configured as a client to CDN. Please click http://epiphan.tv/cdn-partners.php to view the list of CDN providers preferred by Epiphan. By connecting to a CDN server, the broadcast from the DVI Broadcaster DL can be streamed to multiple viewers. By using a CDN, the maximum number of concurrent clients is increased, while at the same time reducing the load on the uplink internet connection.

CDN streaming is a very effective approach when you are broadcasting streams from the Epiphan solutions and want to add scalability to your broadcast. The DVI Broadcaster DL features the Publish Stream functionality that enables you to stream the broadcast either via Epiphan's portal or CDN providers to multiple viewers. You must use the H.264 codec for CDN streaming.

Using CDN it is possible to set a user name and a password for the broadcast. Each viewer will have to request it from you before viewing the broadcast. This function allows you to manage access to your content ensuring visibility only to the appropriate and authorized viewers.

Figure 15 Using a CDN Service Increases Scalability of Concurrent Viewers



The Publish Stream functionality allows for directing captured video and audio to servers or clients using one of the available stream modes. The following options are available:

- **Disabled**. If this option is enabled, you cannot send multicast RTP stream, perform CDN broadcasting or stream video to Epiphan's portal.
- **to xxxxx.epiphan.tv**. This option allows for streaming video to the Epiphan's portal.
- **using RTSP announce**. This option allows for connecting to CDN server.
- **using RTP/UDP push**. This option allows for IP multicast broadcasting.

These options and settings to be performed are discussed further.

The Publish Stream functionality is available only for the H.264 video codec.

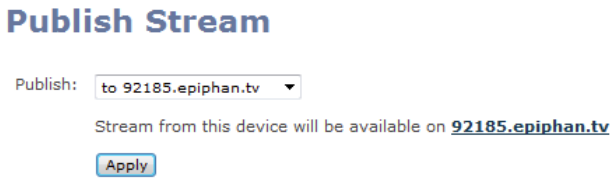
8.2.1 Using Epiphan.tv Portal for Streaming

To set up and perform streaming via Epiphan.tv portal:

1. Click the Publish Stream option in the main menu of the control interface.

2. Select **to xxxxx.epiphan.tv** from the **Publish** drop-down list where xxxxx is the unique serial number of the DVI Broadcaster DL.
3. Select **Enable publishing** and click Apply. The system informs you that stream will be available on the Epiphan's portal and provides a link.

Figure 16 URL to Epiphan Server



4. Click this link and access the portal where the stream is being broadcast in a new window.
5. In case you have selected a codec other than H.264 for streaming (MPEG4 or Motion JPEG), the system will give you a warning (see Figure 17 System Message in Case of Excessive Bitrate Speed). Click on **fix by setting H.264 codec**. The codec will be set to H.264 automatically.
6. In case the bitrate of your broadcast exceeds 500 kbit/s, the system will give you a warning (see Figure 17 System Message in Case of Excessive Bitrate Speed). Click on **fix by reducing bitrate to 500 kbit/s**. The bitrate will be set to 500 kbit/s automatically.
   Note: Epiphan.tv is a demonstration service to help customers experiment with publishing streams to content distribution networks. Therefore certain bandwidth and performance limits are applied. To upgrade to a full service please select one of Epiphan's CDN partners.

Figure 17 System Message in Case of Excessive Bitrate Speed

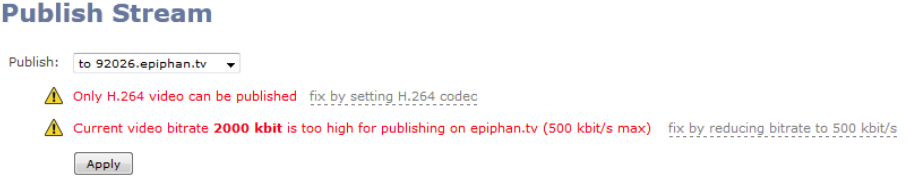

Publish Stream
Publish:
to 92026.epiphan.tv
Only H.264 video can be published
fix by setting H.264 codec
Current video bitrate 2000 kbit is too high for publishing on epiphan.tv (500 kbit/s max)
fix by reducing bitrate to 500 kbit/s
Apply

Figure 18 System Message after Setting H.264 codec and Reducing Bitrate

Publish Stream
Publish:
to 92026.epiphan.tv
Only H.264 video can be published— will be fixed by setting H.264 codec
Current video bitrate 2000 kbit is too high for publishing on epiphan.tv (500 kbit/s max) — will be fixed by reducing bitrate to 500 kbit/s
Apply

Now connection through the media tunnel is established. The DVI Broadcaster DL starts streaming to the Epiphan's portal – **epiphan.tv**.

It is required to set up audio format as **MP3** when streaming through the epiphan.tv. This setting is performed in the control interface's Stream Setup section (see **Select Audio Format**).

There are several buttons available at the bottom of the epiphan.tv portal page (see Figure 19 Epiphan's Portal):

Switch to	Click this button to select a plugin which will be used for viewing the stream. Refer to Figure 20 Plugins Available for Selection on the Portal. The following plugins are available: - Flash RTMP - Flash HTTP - QuickTime - VLC Player
Embed	Displays a code that allows you to embed video stream into your web page. Refer to Figure 21 Code for Stream Embedding.
Direct URL	Displays a list of URLs for different types of broadcasting. Refer to Figure 22 Listing of Direct URLs.

7. Click **Switch to** button and select a plugin for viewing the stream.
8. If you need to embed the stream into your web page, click **Embed** to obtain the code.
9. Click **Direct URL** to obtain the list of URLs for different types of broadcasting.

Figure 19 Epiphan's Portal

Figure 20 Plugins Available for Selection on the Portal

Figure 21 Code for Stream Embedding

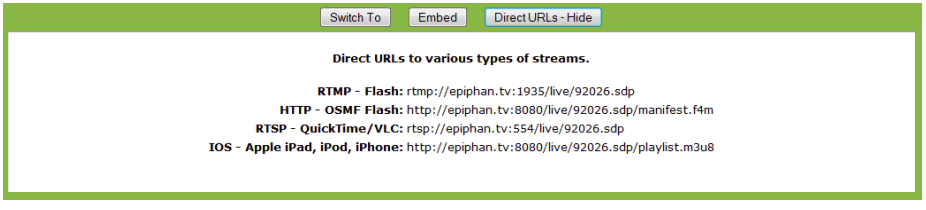
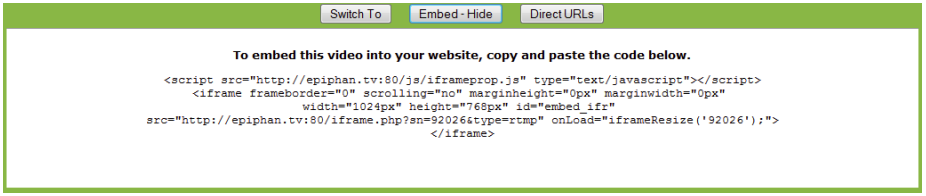

Switch To
Embed
Direct URLs - Hide
Direct URLs to various types of streams.
RTMP - Flash: rtmp://epiphan.tv:1935/live/92026.sdp
HTTP - OSMF Flash: http://epiphan.tv:8080/live/92026.sdp/manifest.f4m
RTSP - QuickTime/VLC: rtsp://epiphan.tv:554/live/92026.sdp
IOS - Apple iPad, iPod, iPhone: http://epiphan.tv:8080/live/92026.sdp/playlist.m3u8

Figure 22 Listing of Direct URLs



Alternatively you can configure DVI Broadcaster DL to stream their content through epiphan.tv directly on the portal.

To view the stream directly on the portal:

1. Type http://epiphan.tv in the address bar of your browser.
2. Enter serial number of DVI Broadcaster DL. It is displayed in the Info section of the Web admin interface.
3. Click the **Go!** button.

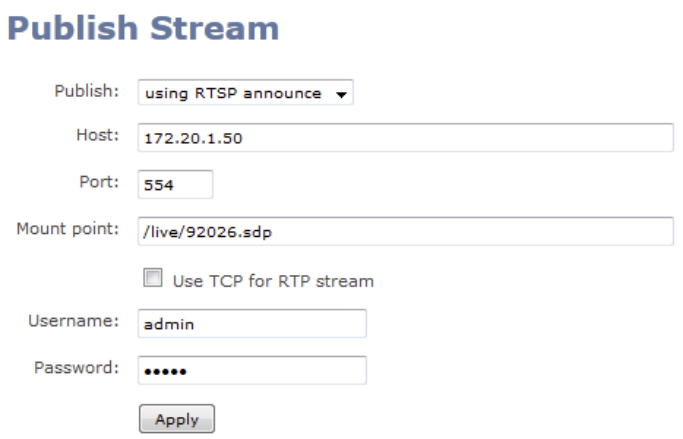
8.2.2 Using Epiphan's Partners as CDN Providers For Streaming

Use this option if you need to perform streaming on a remote streaming server other than **epiphan.tv**. Please contact CDN support to request the list of supported audio codecs and perform the required setting in the control interface's Stream Setup section (see **Select Audio Format**).

To use this option:

1. Select **RTSP Announce** from the drop-down list.
2. Enter the host/server name. For example, **172.20.1.50**.
3. Enter the number of port which is used for streaming to server. Usually for RTSP streaming it is port 554.
4. In the **Mount point** field enter the full path to locate an SDP file on server. This path is provided by the CDN provider.
5. The RTSP protocol uses UDP or TCP as transport layers. If your CDN service requires TCP as a transport layer, select the **Use TCP for RTP stream** check box.
6. If necessary, enter the user and password information.
7. Click **Apply**.

Figure 23 RTSP Announce Functionality



8.2.3 Setting up Multicast from Publish Stream

A multicast RTP stream provides a one-to-many broadcasting framework. In a multicast RTP configuration, the DVI Broadcaster DL sends a packet only once to a router that supports multicasting. This router then distributes the packets to all intended viewer nodes using a multi-cast protocol.

A multicast address is associated with a group of interested receivers. In IPv4, addresses 224.0.0.0 through 239.255.255.255 (the former Class D addresses) are designated as multicast addresses.

Sending multicast streams requires equipment that supports multi-casting, configuring your network and enabling specific multicasting features on the DVI Broadcaster DL. Multicast architectures are used predominantly within a high bandwidth corporate LAN and not on Internet based architectures. Multicast RTP streaming is not usually propagated outside the LAN though it may be propagated through VPNs connecting several LANs. Multicast transmission is available during RTP streaming.

RTP/UDP Push streaming allows you to direct video to a server or client and generates an SDP file containing the stream description. SDP files can be stored on a streaming server, or opened by video players.

To use this option:

1. Select Publish Stream from the main menu.
2. Select **RTP/UDP Push** from the drop-down list.
3. Enter a destination multicast IP address. At this target point the broadcast will be viewed.
4. Specify the numbers of the video and audio ports where the broadcast will be received.
5. Click **Apply**.
6. An SDP file is now generated. It is available in the **Info** section of the Web Admin interface. You can either save an SDP file on your local machine or provide the link to SDP file to your audience.

Figure 24 RTP/UDP Push Functionality

8.3 Viewing Streaming Video

The DVI Broadcaster DL may capture DVI or HDMI video signals in resolutions up to 2048x2048 or 2560x1600 for widescreen applications.

Viewers can access the broadcasted video streams with a web browser that supports Motion JPEG, MPEG4 or Flash Video/H.264 compression or with a media player that is compatible with the stream format being transmitted. The available video stream formats is determined by selected video codec. Audio is available for all formats except from Motion JPEG.

8.3.1 Retrieving the Stream's URL for Broadcasting

In order for viewers to log in and view a stream, the administrator must release the URL(s) of the stream. The administrator is able to provide separate URLs for the stream coming in from the DVI Broadcaster DL video input ports and audio input ports. Alternatively, one URL can be provided that includes all the streams from all input sources. The administrator can retrieve the appropriate stream URL or URLs as explained below.

8.3.2 Using the Web Admin Interface's Info Page

The following indicates where each URL for the broadcast can be found on that page:

Live broadcast is the URL for the broadcast from a video source and an audio port.

The URLs for the broadcast in all available formats are also shown in the Stream Info section.

See an example below.

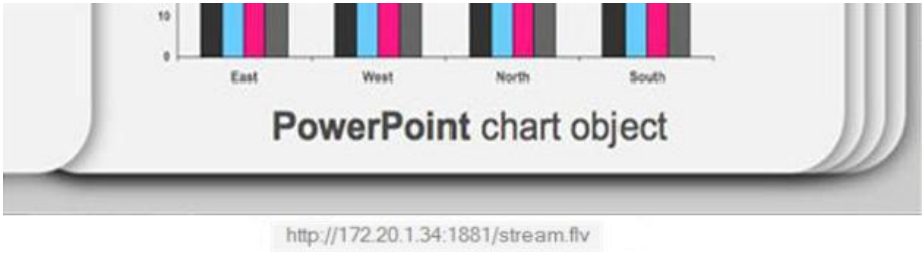
Figure 25 URLs of the Broadcast Displayed in the Stream Info Section

8.3.3 Using the Web Admin Interface's Live View Feature

The second method for retrieving the desired broadcast URLs is to use the Web Admin interface's Live View Feature. This feature not only shows the current broadcast to the administrator but also provides the broadcast URL. By clicking on the **Live View** button from the main menu, a preview of the current broadcast's

videos appear in the web browser. Under the broadcast screen the system displays the URL of the broadcast.

Figure 26 A Broadcast with its URL Displayed Under the Broadcast Image



8.4 Viewing a Broadcast with a Browser

If the administrator has configured a viewer password, participants must obtain the password in order to log in. The administrator will also provide the IP Address or the URL to be used by the viewer's browser.

To log in to view the broadcast using a browser:

1. Start any web browser.
2. Browse to the IP address of the DVI Broadcaster DL's broadcast stream. For example, if the IP address of the DVI Broadcaster DL's broadcast is **172.20.1.33**, then browse to: http:// **172.20.1.33**
3. Enter the following:
   User Name: **viewer**
   Password: (enter the viewer password).
4. Press Enter.
5. The broadcast begins to play within the viewer's browser.

Figure 27 Viewing a Broadcast Using a Web Browser

8.5 Viewing a Broadcast with a Media Player

If the administrator has configured a Viewer password, participants must obtain the password in order to log in. The administrator will also provide the IP Address or the URL to use within the media player.

To log in to view a stream using a media player:

1. Launch the media player.
2. Use the Menu bar to open the URL dialog box and enter the URL address of the stream.
3. When prompted, enter the following:
    a. User name: **viewer**
    b. Password: enter the viewer password.
    c. Press Enter.
4. The stream begins to play within the viewer's player.

8.6 Compatibility Information

This section provides information on compatibility of video streaming formats and player which is necessary for streaming video.

The DVI Broadcaster DL can stream video using Flash (H.264), ASF (MPEG4 or H.264 codecs), Motion JPEG or RTSP (MPEG4 or H.264 codecs). A quick definition of these video streaming methods and the type of application that a viewer would use to watch that particular video stream is now provided.

The **Adobe Flash Video file type** is proprietary but is supported on most web browsers and on many media players including the VLC Media Player. This file type supports the H.264 standard. This video supports analog audio from an external source.

The **Advanced System Format (ASF) file type** also called Advanced Streaming format, can be viewed with the Windows Media Player or the VLC Media Player. Additional codecs may need to be installed to view ASF files. This file type supports H.264 and MPEG4 standards. This video supports analog audio from an external source.

The **Motion JPEG file type** records each frame in the video in JPEG format and can be viewed using most web browsers. This video format does not support analog audio from an external source.

The **RTSP type** supports many media players including QuickTime and MPlayer. This file type supports H.264 and MPEG4 standards. This video supports analog audio from an external source.

9 Recording

The DVI Broadcaster DL captures video and audio data which can be encapsulated in a file and recorded.

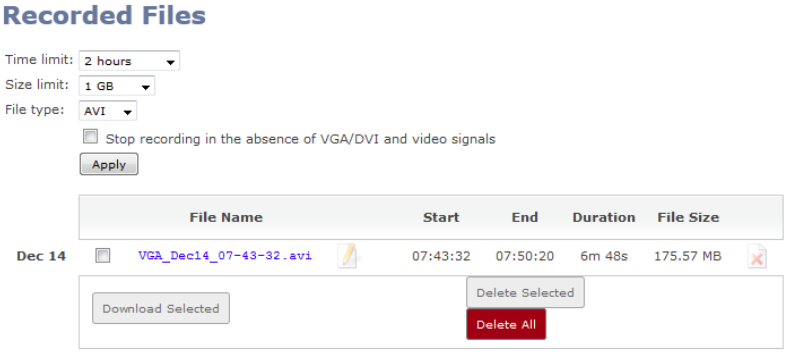
The Web admin interface provides the administrator and operator users with the ability to start, stop and configure the recording. Additionally, recorded video files might need to be downloaded or copied to another device for archiving purposes;

also they might need to be deleted in order to manage disk space on the DVI Broadcaster DL. For organizing, recorded video files may need to be renamed. All of these management tasks are available via the DVI Broadcaster DL's Web admin Interface.

9.1 Selecting Recording File Format

The format of the record is specified using the **Recorded Files** button of the Web admin interface.

Figure 28 Select Recording Format



1. Use the **File Type** drop-down list to select the recording format (**MOV** or **AVI**).
2. Click **Apply**.

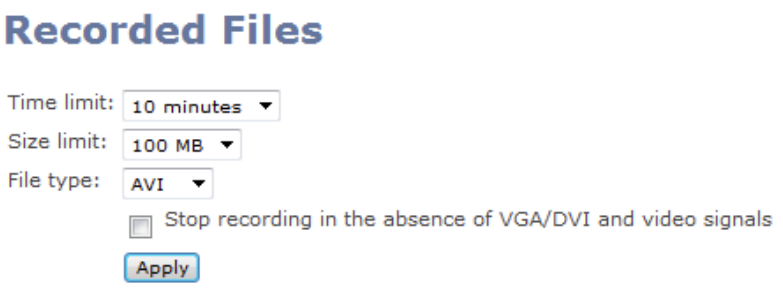
9.2 Changing Time and Size Limits

The DVI Broadcaster DL can record the channel to one or more files according to time and file size limit parameters. It will automatically create and start recording to a new file whenever either limit is reached.

To specify the time and file size limit parameters:

1. Click the **change** command.
2. Select the parameters values from the drop-down list (see Figure 29 Changing Time Limit and Size Limit).

Figure 29 Changing Time Limit and Size Limit



3. Click **Apply**.

Table 11 Time and file size limit parameters

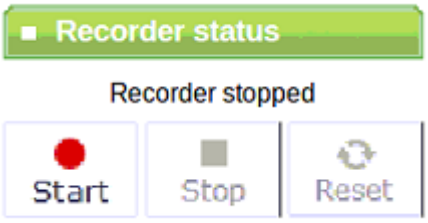
Time limit	Specify the maximum amount of time to record to a file. When either the time limit or the size limit is exceeded, the system starts recording data to a new file.
Size limit	Specify the maximum size of the recorded file. When either the time limit or the size limit is exceeded, the system starts recording data to a new file.

9.3 Starting and Stopping Recording

The recorder status is shown in the Web Admin interface. It is located on the left hand side of the screen above the Web Admin interface's main menu. The ability to manage a recording with the Web Admin interface is done using these buttons.

Note that the format of the recorded file is specified clicking the **Recorded Files** button and selecting the required **File Type** value.

Figure 30 Recorder Status



To start a recording, click the **Start** button in the Recorder status section of the main menu.

To stop a recording, click the **Stop** button in the Recorder status section of the main menu.

To close the file being recorded and start recording to a new file, click the **Reset** button. Or, alternatively click **Stop** and click the **Start** button again.

It is possible to specify whether the recording is stopped in case there is no signal. To enable this parameter, click the **Recorded Files** button of the Web admin interface and select the **Stop recording in the absence of VGA/DVI and video signals** check box.

9.4 Viewing the Current Recording

Viewing the broadcast as it is being recorded is performed by doing the following:

Select **Live View** from the Web Admin Interface's main menu. A preview of the broadcast that is currently being recorded appears in the web browser. The preview is exactly the same as what is being recorded. Under the broadcast screen the system displays the broadcast's URL.

9.5 Recording a Stream on iPad, iPhone and iTouch

You can record a stream on iDevices using EpiphanTouch™. This discovery and remote control application is available as a free download from iTunes and the App

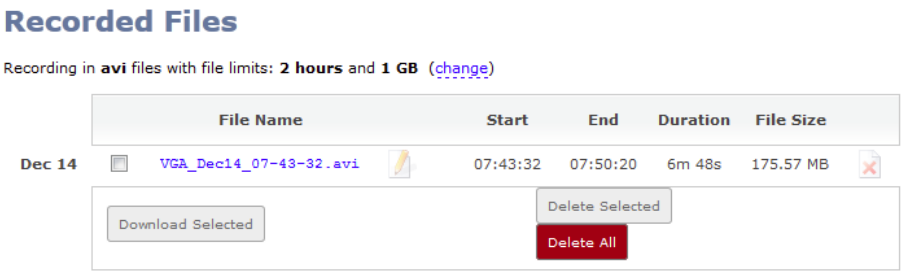
store. It allows you to log into the device as the administrator user. Refer to Epiphan's EpiphanTouch App for iPad, iPhone, iTouch section for details.

9.6 Recorded Files

The Recorded Files page lists all of the video files recorded by the DVI Broadcaster DL and that are saved on it. It is accessed by clicking the **Recorded Files** button from the Web admin interface's main menu.

For each file, the list includes the name of the file, start and end times, duration, and size in MB. Each recording file listing also includes icons that can be used to download, delete, or rename the file.

Figure 31 Recorded Files



9.6.1 Downloading Recordings

Download recordings to either save or view them. Also you can download a single file or multiple files as a single .zip file.

1. Click **Recorded Files**.
2. Click the file you want to download. To download multiple files, select the checkboxes beside all of them and then select the **Download Selected** button at the bottom of the file list.
3. Follow the instructions to download the file or files.

If you select the **Download Selected** button, all of the files that you have selected are downloaded in a single zip file. You must unzip this file to view the individual video files.

If you have downloaded multiple files, select **Continue** to return to the previous page.

9.6.2 Deleting Files

The administrator and operator users can delete files from the DVI Broadcaster DL to free up space on the solid state memory. Files can be selected one at a time, or multiple files can be selected to be deleted. Alternatively there is a **Delete All** button that allows deleting all files that have been previously downloaded. This can be a time-consuming operation.

1. Click **Recorded Files**.
2. To delete individual recordings, select the **Delete File** icon beside the file you want to delete. To delete multiple files, select the checkbox beside the files you want to delete and then select **Delete Selected**.
3. Follow the instructions to delete the file or files. The files are deleted from the solid state memory.

9.6.3 Renaming Files

The administrator and operator users can rename one file at a time. Again, this function is done by going to the **Recorded Files** section from the Web admin interface main menu.

To rename a file:

1. Click **Recorded Files**.
2. Select the rename file icon .
3. Enter the new name for the file.
4. Select **Submit**.

9.6.4 Viewing Completed Recording Files

As broadcasts are being recorded into the file, they can be viewed using the Live View button in the Web Admin interface. Closed recordings can be viewed using a compatible media player.

The instructions below explain how to view a closed recording file using the default media player installed on a computer. These instructions will only work when using

the default player. To view a closed recording file using another player the closed file will need to be downloaded or copied to a location that is accessible by the player. The recorded file will then be opened from within the player itself.

1. Once the recording is completed, log into the Web Admin interface.
2. Click **Recorded Files** in the main menu and click the file that is to be viewed.
3. The system will suggest you to open the file with the computer's configured default player. For example, for systems running Windows, the default player is the Windows Media Player.
4. The player opens the window with the recording.

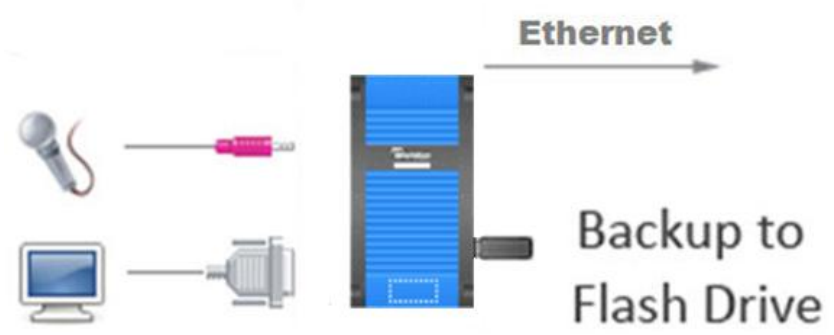
9.7 File Transfer of Recorded Files

The DVI Broadcaster DL provides several options to automatically copy recordings to a network storage location, or a USB flash drive. This is a great feature for professional AV service providers that want to provide a copy of the presentation to the speaker before they leave the presentation venue.

9.7.1 Copying Recorded Files to a USB Flash Drive

The DVI Broadcaster DL is equipped with USB ports that can be used to copy recorded data from the DVI Broadcaster DL to an external USB flash drive formatted with one partition in one of the following file systems: FAT32, ext3, ext2, ISO 9660, HFS. This is a great feature for professional AV service providers that want to provide a copy of the presentation to the speaker before they leave the presentation venue.

Figure 32 A USB Flash Drive Connected to a USB port Receives Recorded Data



A flash drive can be connected to the DVI Broadcaster DL any time. Stick a flash drive into a USB port on the device and press lightly. The stick fits into the port only one

way. After inserting, the DVI Broadcaster DL will recognize the stick, however, this occurs without any user notification whatsoever.

Figure 33 Insert a USB Flash Disk

The DVI Broadcaster DL copies to the inserted USB flash drive, only files recorded before inserting the flash drive, starting from the oldest record to the newest. The flash drive's LED (if any) will be blinking indicating data transfer. The DVI Broadcaster DL can copy maximum 100 recorded files to the flash drive. If you are making new recordings during copying data to the flash drive, these new recordings will not be copied.

Due to speed limitations flash drives are not capable of recording data on the fly. This means that while the previously recorded data captured by the DVI Broadcaster DL on its internal solid state memory will be copied to the flash drive, the currently opened recording file cannot be copied until the file is closed. Once closed, it is then available for copying.

Once the data has been copied, safely remove the flash drive. To check its free storage, files that have been copies and their size, insert the drive into a computer and see its properties.

9.8 Automatic File Upload

The automatic file upload feature will automatically copy recorded video files from the DVI Broadcaster DL to another device on your network. This feature's page is reached from the Web admin interface's main menu by clicking on **Automatic File Upload**.

By uploading recorded broadcast files to another network device, these broadcasts become available to be viewed from other device besides the DVI Broadcaster DL. This feature also provides a method of automatically archiving recorded broadcast files after they are closed.

Note that the files that are currently being copied to another device on your network, have an extension **.part**. The image below is a screenshot from the user's PC. There is a folder where the files are being copied from the DVI Broadcaster DL. Copying is enabled. One file with the extension **.part** is now being copied from DVI Broadcaster DL.

Figure 34 The File is Being Copied Now

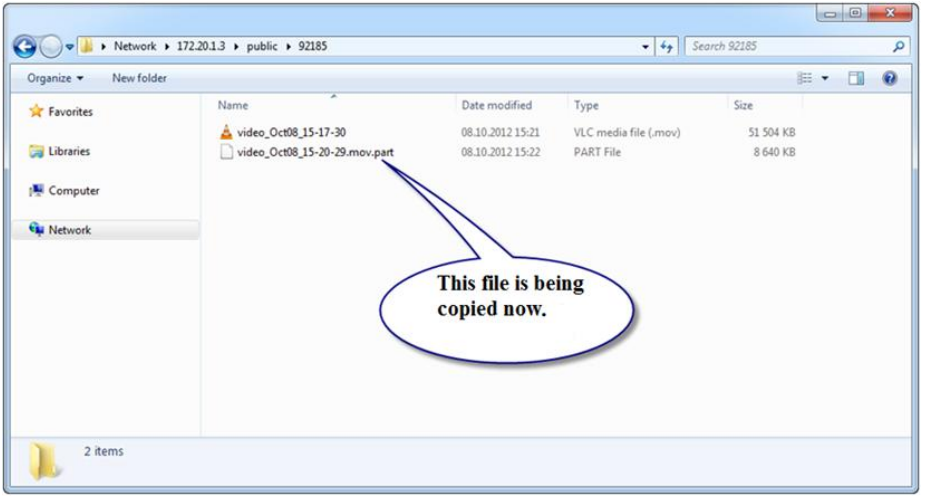
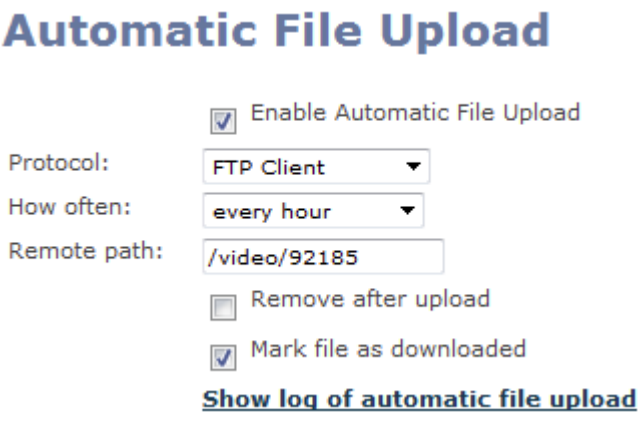


Table 12 ***Automatic File Upload Configurable Options***

Enable Automatic File Upload	Check this box to enable this feature, uncheck this box to disable this feature.
Protocol	Select the upload client.
How often	Select how often video files are to be uploaded. By selecting **On file rotation**, the DVI Broadcaster DL uploads each video file after it stops recording the current video file and starts recording the next one. You can also configure the DVI Broadcaster DL to upload all video

	files every 1, 6, 12, or 24 hours.
Remote path	The path on the upload server to upload the video files to. This path must match an actual path on the server. If a path is not entered, the files are uploaded to the root location.
Remove after upload	If you select this checkbox, the video files will be deleted on DVI Broadcaster DL after uploading. In case the check box is not selected, the system check if there is enough place for a new file based on the size limit value (please refer to **Changing Time and Size**). If there is not enough place, the system deletes the oldest files.
Mark file as downloaded	Select the checkbox to keep the files on DVI Broadcaster DL after uploading copies to the server. The filenames before uploading are displayed in blue. The filenames after uploading are displayed in purple.
Show log of automatic file upload	Use this command to display the log of file uploads

Figure 35 Configuring the Automatic File Upload Feature



9.8.1 Configuring Automatic File uploads

Recorded files can be uploaded to a CIFS server (a Windows share), an RSync server, or an FTP server.

1. Select **Enable Automatic File Upload**.
2. Set **Protocol** to *FTP Client*, *RSync Client*, or *CIFS client* depending on what upload server is being used.
3. If the **How often** option is set to *On file rotation,* the DVI Broadcaster DL will upload each video file after it stops recording to it. Alternatively, the DVI Broadcaster DL can be set to upload all video files every 1, 6, 12, or 24 hours.
4. Set **Remote Path** to the path on the upload server to upload the video files to. This path must match an actual path on the server. If a path is not provided, the files are uploaded to the root location.
5. Select the **Remove after upload** checkbox to delete all video files on the DVI Broadcaster DL after uploading them.
6. Select **Mark file as downloaded** to keep the files on the DVI Broadcaster DL device after uploading copies to the server. The filenames before uploading are displayed in blue. The filenames after uploading are displayed in purple. Note: In case you select both checkboxes (**Remove after upload** and **Mark file as downloaded)** the files uploaded to server will be removed from the device.

7. Configure the appropriate client for the designated upload server:

    - If the upload server is a CIFS server (for example, a Windows shared folder), select and configure the CIFS Client. See **Configuring a CIFS Client**.
    - If the upload server is an RSync server, select and configure the RSync client. See **Configuring an RSync Client**.
    - If the upload server is an FTP server, select and configure the FTP Client. See **Configuring an FTP Client**.

8. Click **Apply**.

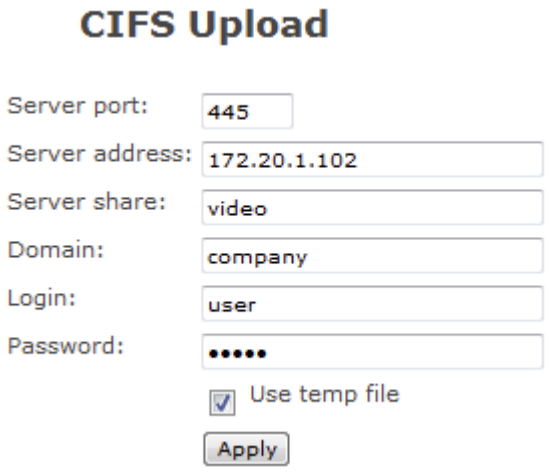
The first copy is made after the time period set in **how often** expires. For example, if the DVI Broadcaster DL is set to upload files every hour, the first set of files is uploaded after one hour. If five video files are saved in the first hour, those five video files are uploaded. One hour later, all of the video files saved since the start of that hour are uploaded.

Video files saved before you selected **Apply** are not uploaded. For files saved before Automatic File upload is configured, a manual upload process will have to be done.

9.8.2 Configuring a CIFS Client

Use the CIFS client configuration to have the DVI Broadcaster DL device behave as a CIFS client connecting to a CIFS server (such as a Windows shared folder) when uploading broadcast files. Different networks may have different CIFS server configurations. If required, contact your network administrator for assistance with getting the DVI Broadcaster DL to connect to the server. Depending on your CIFS server configuration you may not have to enter information in every field shown in the following diagram.

Figure 36 Configuring a CIFS Client



To configure the CIFS client:

1. Select *CIFS Client* in the **Protocol** field.
2. Enter the **Server port** if the CIFS server uses a non-standard port. If your CIFS server uses standard ports you should not have to add any information to this field. If your server uses non-standard ports or looks for a non-standard port first, enter the port number in this field.
3. Enter the **Server address**. This can be the numeric IP address or fully qualified domain name of the CIFS server.

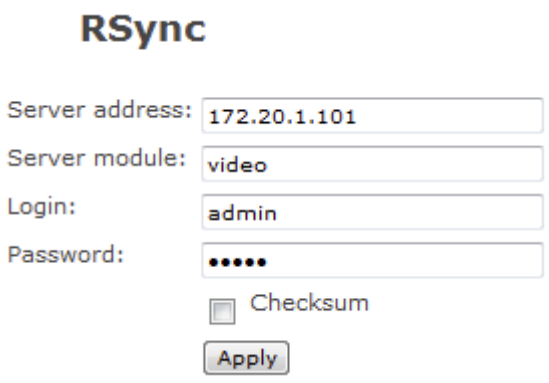
4. Enter **Server share**. This is the CIFS share name or the name of the Windows shared folder on the CIFS server.
5. If required, enter the name of the CIFS **Domain**. The Domain can be a Windows Domain or Work Group name.
6. Enter the **Login** and **Password** required to authenticate with the CIFS server to connect to the server share.
7. Select the **Use temp file** check box to upload a temporary file. This prevents you from using a file which is not fully uploaded yet. After the file is uploaded, it is renamed to its original name.
8. Select **Apply**.

The DVI Broadcaster DL will then attempt to connect to the CIFS server. To view messages about whether the DVI Broadcaster DL is able to connect to the CIFS server and the status of the connection, click **Show log of automatic file upload (**Figure 35 Configuring the Automatic File Upload Feature**)**.

9.8.3 Configuring an RSync Client

Use the RSync client configuration to have the DVI Broadcaster DL act as an RSync client connecting to an RSync server. Different networks may have different Rsync server configurations. If required, contact your network administrator for assistance with getting the DVI Broadcaster DL to connect to the server.

Figure 37 Configuring an RSync Client



To configure the RSync client:

1. Select *RSync Client* in the **Protocol** field.
2. Enter the **Server address**.

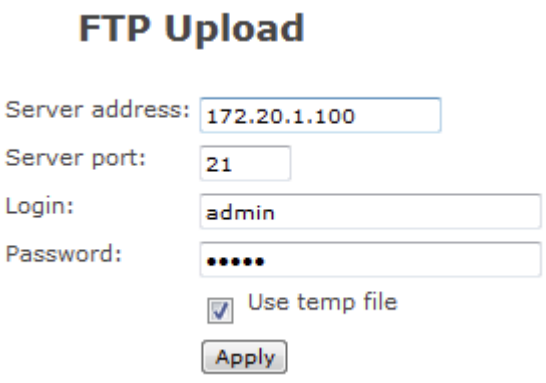
3. Enter **Server module** which is a directory on the RSync server.
4. Enter the **Login** and **Password** required to authenticate with the RSync server to connect to the server share.
5. Select the **Checksum** checkbox to enable computing checksums algorithm applied during file synchronization between sender and recipient servers.
6. Select **Apply**.

The DVI Broadcaster DL will then attempt to connect to the RSync server. To view messages about whether the DVI Broadcaster DL is able to connect to the RSync server and the status of the connection, click **Show log of automatic file upload (**Figure 35 Configuring the Automatic File Upload Feature**)**.

9.8.4 Configuring an FTP Client

Use the FTP client configuration to have the DVI Broadcaster DL act as an FTP client to an FTP server to upload broadcast files. Different networks may have different FTP server configurations. If required, contact your network administrator for assistance with getting the DVI Broadcaster DL to connect to the server.

Figure 38 Configure an FTP Client



To configure the FTP client:

1. Select *FTP Client* in the **Protocol** field.
2. Enter the **Server port** if the FTP server uses a non-standard port. The standard FTP port is TCP 21.
3. Enter the **Server IP address**.
4. Enter the **Login** and **Password** required to authenticate with the FTP server to connect to the server.

5. Select the **Use temp file** check box to upload a temporary file. This prevents you from using a file which is not fully uploaded yet. After the file is uploaded, it is renamed to its original name.
6. Select **Apply**.

The DVI Broadcaster DL will then attempt to connect to the FTP server. To view messages about whether the DVI Broadcaster DL is able to connect to the FTP server and the status of the connection, click **Show log of automatic file upload (**Figure 35 Configuring the Automatic File Upload Feature**)**.

9.8.5 Testing the Automatic File Upload

Test the automatic file upload to ensure all settings are correct.

To test automatic file upload:

1. Confirm that the upload server is operating.
2. Start recording the stream.
3. Log into the Web admin interface.
4. Select **Automatic File Upload**, from the main menu.
5. Set the **How Often** setting to *On file rotation*.
6. Click the **Reset** button in the main menu. The file currently being recorded will be closed and saved.
7. The recording will then be uploaded to the configured remote path using the configured client.
8. Check the server to confirm that the most recently saved video file has been uploaded to it and it is in the proper path location on that server.

If the file is not uploaded, click **Show log of automatic file upload** to view the log. Verify that the client configuration and Automatic File Upload configuration settings are correct. Check the remote device's root path, if the remote path is incorrectly configured, the broadcast file will be uploaded to that location.

Check the **Recorded Files** page from the Web admin interface:

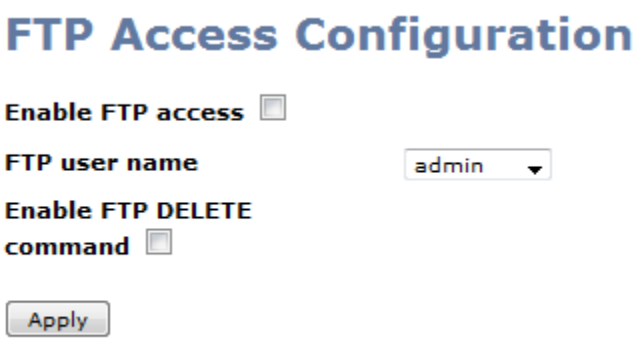
If the **Remove after upload** checkbox is selected, the uploaded file should have been deleted from the **Recorded Files** section.

9.9 FTP Server

An FTP server can be configured on the DVI Broadcaster DL to enable a FTP client to connect to the DVI Broadcaster DL's internal solid state memory. An FTP client can be used to manually download video files from the DVI Broadcaster DL. FTP access can also be given permission to delete video files remotely from the DVI Broadcaster DL.

The FTP access options are accessible from the Web admin interface's main menu, **FTP Server**.

Figure 39 FTP Server Options



Enable FTP Access	Enables FTP access to the DVI Broadcaster DL.
FTP user name	Select one of the following users as the FTP client: • admin • operator • viewer
Enable FTP DELETE command	Select this option to grant the FTP client the ability to delete videos from the DVI Broadcaster DL internal memory.

10 Networking

10.1 Connecting Directly to the System

This section discusses how to directly connect to the DVI Broadcaster DL using the factory default network settings. This method must be used if the network where

the DVI Broadcaster DL resides does not have a DHCP server, you have lost the correct network settings or it is desired to simply connect a capture workstation and the DVI Broadcaster DL without a router, by simply using a direct connect Ethernet cable.

The next section discusses tools that can be used to discover the DVI Broadcaster DL that has been plugged into the local network and been assigned an appropriate IP address for the given network by a DHCP server. This network discovery also applies if the device was assigned a static IP.

Either method, connecting directly or connecting using network discovery, is required to access the DVI Broadcaster DL to allow for further configuring of the device.

10.1.1 Rescue Settings

The DVI Broadcaster DL comes with the following static address settings:

IP: 192.168.255.250 (this special IP address is permanent to improve safety).

Netmask: 255.255.255.252

User Name: admin (no password)

For more information on the admin user, see the section **Configuring Administrator Access** .

10.1.2 Connecting Directly to the DVI Broadcaster DL

Using the default network settings, perform the following steps:

1. Record the network settings of the workstation being used to connect to the DVI Broadcaster DL so that they can be restored later if needed.
2. Temporarily change the network configuration on the workstation to the following:
    a. Static IP assignment
    b. IP address: 192.168.255.249
    c. Subnet mask: 255.255.255.252
3. Establish an Ethernet connection between the DVI Broadcaster DL and the workstation by one of the following methods:
    a. Connect the DVI Broadcaster DL's Ethernet port to the same Ethernet network as the workstation
    b. Connect the DVI Broadcaster DL's Ethernet port to an Ethernet network switch and connect the workstation's Ethernet to that same switch.

   c. Connect the DVI Broadcaster DL's Ethernet port directly to the workstation's Ethernet port using either a regular or a crossover Ethernet cable.
4. Start a web browser on the workstation and browse to: http://192.168.255.250/admin/
5. Log in as the administrator user:
   User Name: **admin**
   Password:**<return>**
6. The DVI Broadcaster DL's Web admin interface opens. See the chapter, Web Admin Interface, for more details on using the Web admin Interface to configure the DVI Broadcaster DL.
7. Restore the previously save network configurations on the workstation.

10.2 Network Discovery of the DVI Broadcaster DL

Instead of connecting directly as described in the previous section, to the DVI Broadcaster DL, the DVI Broadcaster DL can be discovered on the network and its IP address can be obtained.

You can easily access the DVI Broadcaster DL in the network using service discovery tools. Please refer to **Access through Service Discovery** section.

When the DVI Broadcaster DL device is configured for DHCP and has been plugged into a network with a DHCP server, the DHCP server automatically assigns an IP address to the DVI Broadcaster DL relevant to the network. Determining the IP address assigned to the DVI Broadcaster DL is required to access the DVI Broadcaster DL to allow for further configuring of the device.

There are tools that will return the DVI Broadcaster DL's IP address. Epiphan provides two such tools and they are described in the following section.

Alternatively, contact the relevant network administrator to retrieve the DVI Broadcaster DL's IP address.

Regardless of the method used to obtain the DVI Broadcaster DL's IP address, its assigned IP address is required to allow for any further configuring.

10.2.1 Epiphan's Network Discovery Utility

Epiphan's Network Discovery Utility runs on a Windows based PC. It finds the DVI Broadcaster DL device on the network and displays its assigned IP address. The Network Discovery Utility can also be used to connect to the DVI Broadcaster DL Web admin interface tool.

10.2.1.1 To install Epiphan's Network Discovery Utility Tool

1. Find the latest Network Discovery Utility on the website's download page (http://www.epiphan.com/downloads/).
2. Select **Download Network Discovery Utility**. Ensure to note the download destination folder.
3. Run NetworkDiscovery.exe from the above noted download destination folder.
4. Select Search to find the Epiphan devices connected to the network.

The Network Discovery Utility can only find the Epiphan devices on the same network as the Windows PC that is running this utility.

10.2.2 Epiphan's EpiphanTouch App for iPad, iPhone, iTouch

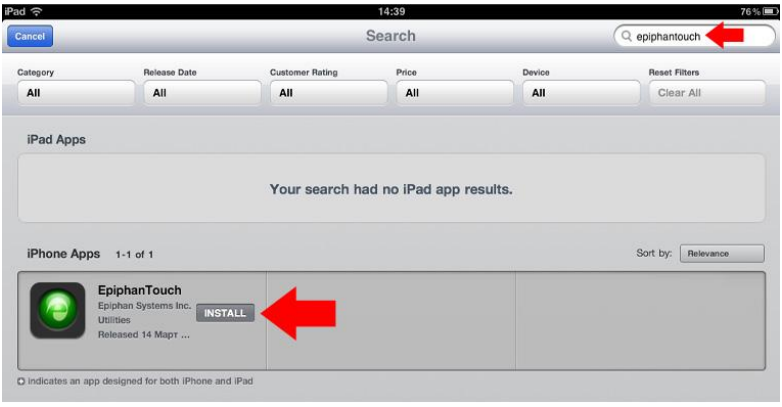
EpiphanTouch™ is a discovery and remote control application available as a free download from iTunes and the App store.

EpiphanTouch finds, provides the IP address, and can be used as a remote control to start and stop broadcastings and recordings on the DVI Broadcaster DL. It will list all Epiphan devices including the DVI Broadcaster DL operating on the same network as the iPhone, iTouch, or iPad that is running the EpiphanTouch application.

10.2.2.1 To install and use EpiphanTouch from iTunes:

1. Either follow the URL to go directly to the EpiphanTouch page in the App store:http://itunes.apple.com/pk/app/epiphantouch/id424405619?mt=8# or search for the EpiphanTouch application in the App Store using the **Search** field.

Figure 40 Search for EpiphanTouch in the App Store



2. Install the EpiphanTouch App on your iDevice.
3. The EpiphanTouch will discover all Epiphan devices. The IP addresses of all devices will be displayed. Record the IP address corresponding to the DVI Broadcaster DL you want to configure. If there is more than one Epiphan device on the network, you can identify your DVI Broadcaster DL by the serial number displayed.
4. To use EpiphanTouch's remote control feature, select the desired DVI Broadcaster DL and log into the device as the administrator user. See section The Administrator User for more details about logging into the DVI Broadcaster DL.

Figure 41 Log into the DVI Broadcaster DL as the Administrator

5. Start or stop video capturing and recording.

10.3 Setting IP Address

Changing the network configuration involves setting how the DVI Broadcaster DL receives an IP address. IP Addresses can be assigned statically or dynamically with the use of a DHCP server. For network configuration changes to take effect, the DVI Broadcaster DL device must be rebooted after making the changes, refer to the section **Rebooting or Restarting** .

If the IP address is changed, the DVI Broadcaster DL must be removed from the Network Discovery Utility and then re-discovered by selecting **Search**.

Additionally, the DVI Broadcaster DL's MAC address is displayed on the Network Configuration page. Providing the MAC address to your network administrator may be helpful for managing your network.

10.3.1 Set the DVI Broadcaster DL to use a static IP address

1. Log into the Web admin interface.

2. Select **Network** from the main menu.
3. Select **Use static address**.

   Enter an IP Address, Network Mask, Default Gateway, and DNS Server that are valid for your network. Ensure that this gateway setting is the gateway of your local LAN, i.e. the local router. Contact your network administrator if you are not sure what information to use. The IP address, Network Mask, Default Gateway, and DNS Server assigned must be compatible with your network.
4. Select **Apply** to save these changes.
5. Select **Maintenance**.
6. Select **Reboot Now**.
7. It takes a few minutes for the DVI Broadcaster DL device to reboot.
8. After a few minutes log into the Web admin interface. Logging into the Web admin interface can be done by:
   a. Using a browser and browsing to the new IP address assigned to the DVI Broadcaster DL.
   b. Using the Network Discovery Utility, see section Logging into the Web Admin Interface for more details.
9. Re-log into the Web admin interface using the administrator username and password.

10.3.2 Set the DVI Broadcaster DL to use a DHCP server

By default, the DVI Broadcaster DL is configured to connect to a network using a DHCP server, the DHCP server will automatically configure the network settings and assign a relevant IP address to the DVI Broadcaster DL. This section describes how to re-enable DHCP settings if they have been disabled.

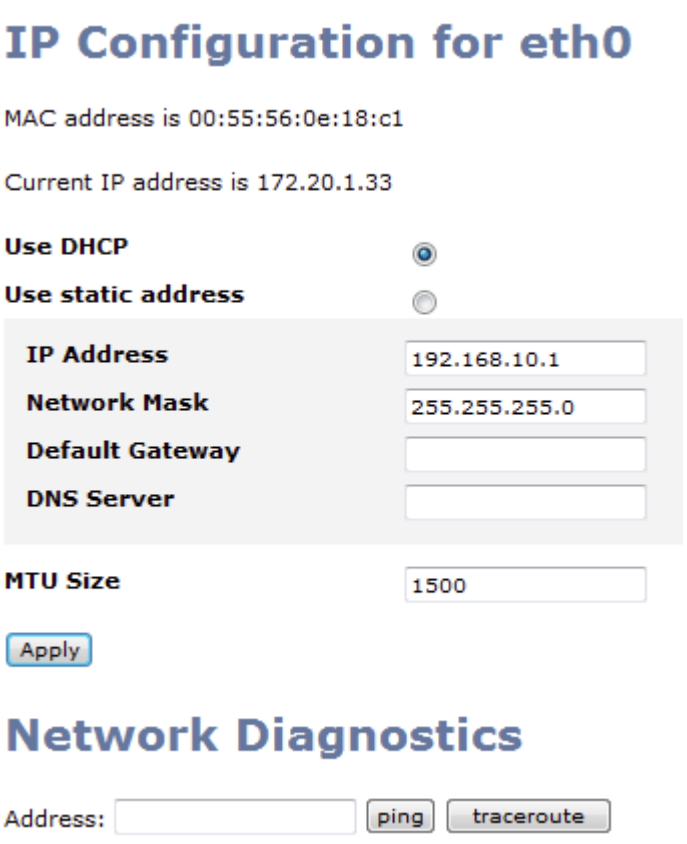
1. Log into the Web admin interface.
2. Select **Network** from the main menu.
3. Select **Use DHCP**.
4. If required, in the **MTU Size** field specify the largest packet size permitted for Internet transmission. If this value is too large for the connection, it

may result in packet loss or dropping Internet connection.

5. The other fields can be left as is.
6. Select **Apply** to save these changes.
7. Select **Maintenance**.
8. Select **Reboot Now**. It takes a few minutes for the DVI Broadcaster DL device to reboot.
9. After a few minutes log into the Web admin interface. Logging into the Web admin interface can be done by:
    a. See the section **Network Discovery of the** on how to obtain the IP address for DVI Broadcaster DL
    b. Using a browser and browsing to the new IP address assigned to the DVI Broadcaster DL.
    c. Using the Network Discovery Utility, see section Logging into the Web Admin Interface for more details.
10. Re-log into the Web admin interface using the administrator username and password.

The following diagram shows the network page from the Web admin interface and enabling DHCP.

Figure 42 Enabling DHCP



10.3.3 Performing Network Diagnostics

A tool in the Network section of the web interface combines the functionality of the **traceroute** and **ping** programs in a single network diagnostic tool.

Traceroute is a computer network diagnostic tool for displaying the route or path and measuring transit delays of packets across an Internet Protocol (IP) network.

Ping is a computer network administration utility used to test the reachability of a host on an IP network and to measure the round-trip time for messages sent from the originating host to a destination computer.

This tool investigates the network connection between the host that the DVI Broadcaster DL runs on and a user-specified destination host. After entering the URL

or IP address, click either **ping** or **traceroute**. If ping is clicked, the tool determines the reachability of the user-specified host. If **traceroute** is clicked, the route and measures transit delays of packets is displayed. As it does this, the tool displays statistics about each machine.

Figure 43 Statistics displayed by the diagnostics tool after using the Ping utility

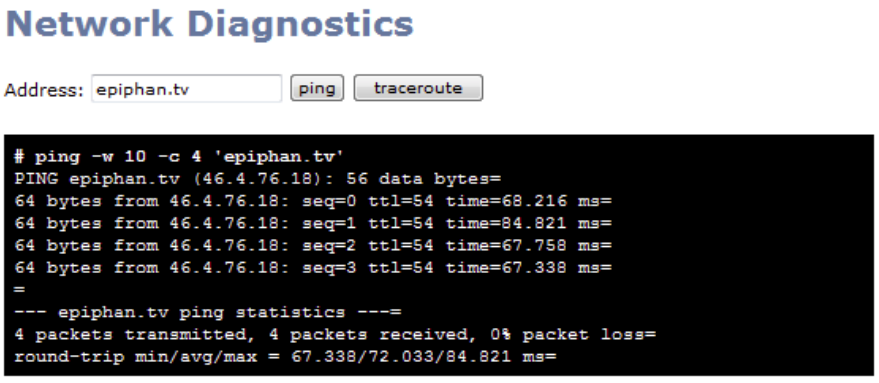
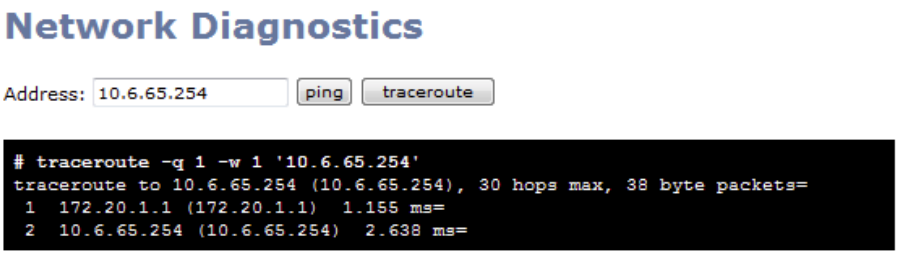

Network Diagnostics
Address: epiphan.tv
ping
traceroute
ping -w 10 -c 4 'epiphan.tv'
PING epiphan.tv (46.4.76.18): 56 data bytes=
64 bytes from 46.4.76.18: seq=0 ttl=54 time=68.216 ms=
64 bytes from 46.4.76.18: seq=1 ttl=54 time=84.821 ms=
64 bytes from 46.4.76.18: seq=2 ttl=54 time=67.758 ms=
64 bytes from 46.4.76.18: seq=3 ttl=54 time=67.338 ms=
=
--- epiphan.tv ping statistics ---=
4 packets transmitted, 4 packets received, 0% packet loss=
round-trip min/avg/max = 67.338/72.033/84.821 ms=

Figure 44 Statistics displayed by the diagnostics tool after using the Traceroute utility


Network Diagnostics
Address: 10.6.65.254
ping
traceroute
traceroute -q 1 -w 1 '10.6.65.254'
traceroute to 10.6.65.254 (10.6.65.254), 30 hops max, 38 byte packets=
1 172.20.1.1 (172.20.1.1) 1.155 ms=
2 10.6.65.254 (10.6.65.254) 2.638 ms=

11 System Administration

11.1 Setting the Date and Time

The date and time can be set manually or Time synchronization can be enabled on the DVI Broadcaster DL. Configuring how the date and time is managed on the DVI Broadcaster DL is done by selecting **Date and Time** from the Web admin interface's main menu.

Clicking **Enable Time Synchronization** on the Date and Time page, results in the date and time being received from a public network time protocol (NTP) server. This is done by having the DVI Broadcaster DL connect to the server over the Internet. NTP uses UDP and port 123. The default NTP server is time.nrc.ca. This should be changed to a NTP server that is recommended for your location. This information should be available from your network administrator.

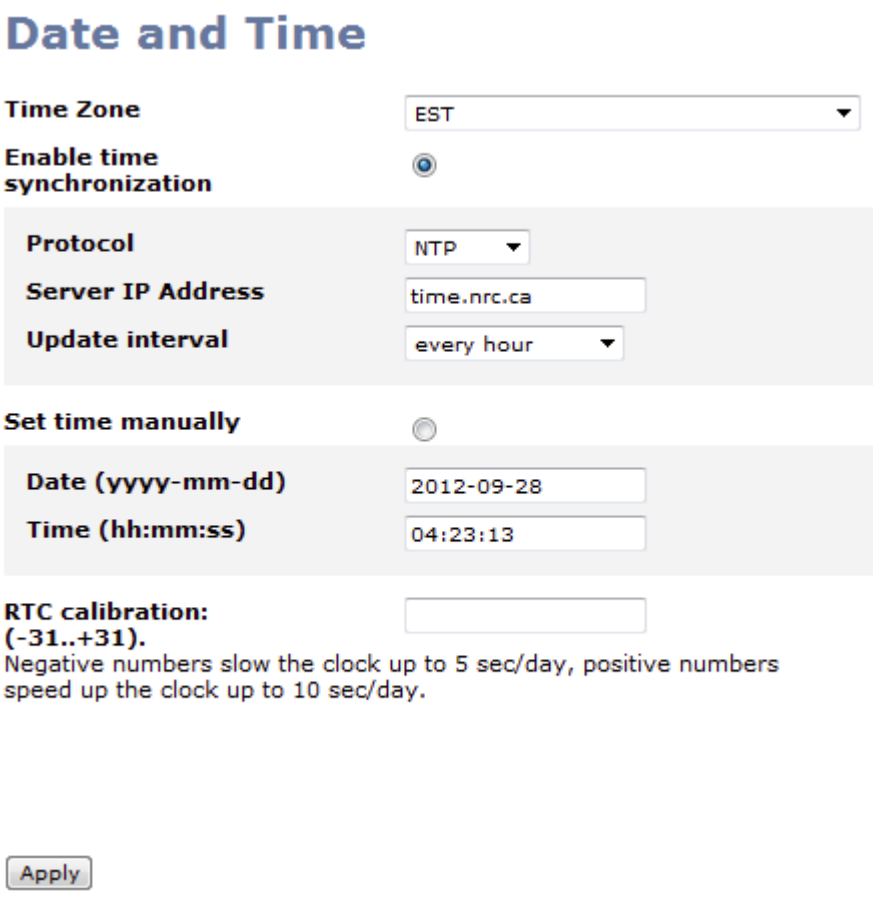
For more information about NTP, including a list of recommended NTP servers, refer to the following webpage: The NTP Public Services Project.

To get the correct time from the NTP server, ensure that the correct Time Zone for the location of the DVI Broadcaster DL is selected.

If the DVI Broadcaster DL device cannot connect to the Internet and there is an RDATE server on the network, you can set time synchronization to use RDATE (as defined by RFC 868). Contact your network administrator for the address of the RDATE server and enter the RDATE server IP address into the Server IP Address field.

In both cases, how often the date and time is updated can be configured. The Time Update interval can be every 1, 6, 12, or 24 hours.

Figure 45 Setting the Date and Time



The following table summarizes the configurable options for setting the date and time.

Table 13 ***Date and Time Configurable Options***

Time Zone	Select the appropriate time zone
Enable time synchronization	This parameter enables time synchronization with a NTP or RDATE server
Protocol	Select the time protocol
Server IP	Enter the IP address of the NTP or RDATE server

Address	
Update interval	Specify the frequency of time synchronization
Set time manually	This parameter enables manual time setting
Date (yyyy-mm-dd)	Specify the date
Time (hh:mm:ss)	Specify the time
RTC calibration: (-31..+31).	This field allows RTC calibration, the slowing or speeding the clock up to 10 sec/day. Negative numbers slow the clock down up to 5 seconds a day and positive numbers speed up the clock up to 5 seconds a day.

11.2 Configuring Administrator Access

Initial factory settings provide no password for the administrator user. For security reasons, a password to control access to the administration functions should be added.

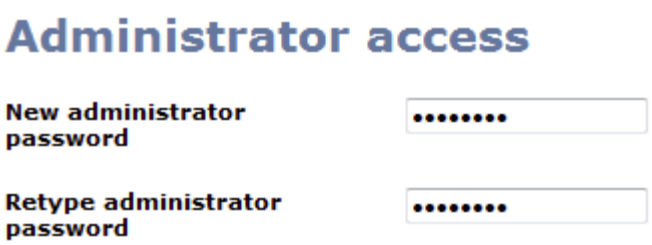
The administrator user's password can be added or changed at any time in the **Access Passwords** section of the Web Admin interface.

If you lose or forget the admin password you can reset the device to its factory default setting. See Restoring the DVI Broadcaster DL Default Factory Configuration in order to reset the device to factory defaults.

11.2.1 To add or change the Administrator password

1. Log into the Web admin interface.
2. Select **Access Passwords**.
3. Enter the new password in the **New administrator password** field. The password is case sensitive and can include up to 255 ASCII characters.
4. Repeat the password using the **Retype administrator password** field.
5. Select **Apply**. The Web admin interface will log off the current administrator user.
6. When prompted, re-log into the Web admin interface with the admin user name and the new password.

Figure 46 Adding or Changing the Administrator's Password



11.2.2 Deleting the Administrator password

The administrator password can be deleted if it is not required. However, by removing the administrator password, it makes it easier for unauthorized users to change the DVI Broadcaster DL's configuration.

1. Log into the Web admin interface
2. Select **Access Passwords.**
3. Select **Apply** leaving the administrator password fields blank.
4. When prompted, re-log in leaving the password field blank.

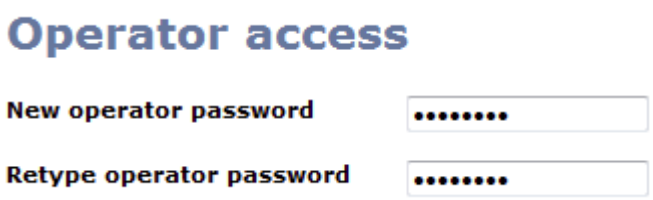
11.3 Configuring Operator Access

An operator's role allows you to grant particular rights to some users. They are able to have access to the recorded files and can adjust frame grabber and audio settings. It is highly recommended to set a password for the operator's role.

11.3.1 To add or change the Operator password

1. Log into the Web admin interface.
2. Select **Access passwords**.
3. Enter the password in the **New operator password** field
4. Repeat the new password in the **Retype operator password** field. The password is case sensitive and can include up to 255 ASCII characters.
5. Select **Apply**.
6. Distribute or communicate the operator access password to authorized operators of the broadcast.

Figure 47 Changing the Operator password



11.3.2 Delete the Operator Password

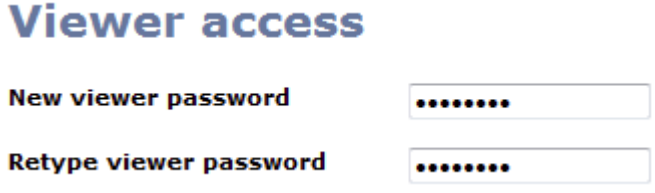
The operator password can be deleted if operators are not required to enter a password to access the broadcast.

1. Log into the Web admin interface.
2. Select **Access Passwords**. The password fields should be blank.
3. Select **Apply** without adding characters to the password fields. The password is deleted.

11.4 Configuring Viewer Access

Controlling viewer access to a broadcast can be done in two different ways. The first is to assign a password to the DVI Broadcaster DL's viewer password and the second is to enable IP Address based authentication. By default the viewer user does not have a password to control access and no IP Address based authentication is enabled. Viewers have access only to Live View functionality in browser or direct streams in player.

Figure 48 Changing the Viewer Password



11.4.1 To add or change the viewer password

Used to add or change the password associated with the viewer user. The viewer access password is the same for all viewers until it is changed. Any viewer that knows the password will continue to have access until the password is changed. It is good practice to change the password each time there is a change in the users that should be authorized to access the broadcast. Please contact your network security administrator with respect to password management required for your applications.

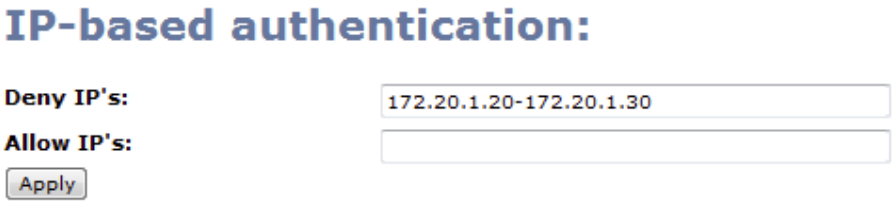
Once a viewer password is configured, participants must obtain the current viewer password in order to log in. The user name is always the same: **viewer.** It cannot be changed. If the viewer password is changed during a broadcast, the broadcast is interrupted and all viewers will be required to re-log in using the new viewer password in order to continue receiving the broadcast. Depending on how the viewer is receiving the broadcast, this will involve clicking the refresh button in the viewer's browser or clicking on the play button in the viewer's media player.

1. Log into the Web admin interface.
2. Select **Viewer Access**.
3. Enter and repeat the new password. The password is case sensitive and can include up to 255 ASCII characters.
4. Select **Apply**.
5. Distribute or communicate the viewer access password to authorized viewers of the broadcast.

11.4.2 Configuring IP-based Authentication for Viewers

This function allows the option of providing access to the broadcast to a large number of users without having each individual user log in with the viewer username and password. This is done by configuring individual IP addresses or a range of IP addresses that are either granted access or denied access to the broadcast. Once set up, users can access the broadcast just by clicking on a supplied link. The administrator for the broadcast would continue to access the Web admin interface using the administrator user credentials to access all features.

Figure 49 IP-based Authentication



If any addresses are specified in the **Allow IP's** field, access to the broadcast will be allowed only for these addresses.

If any addresses are specified in the **Deny IP's** field, access to the broadcast will be forbidden for these addresses and allowed for all other addresses.

The list of denied IP addresses has a higher priority over the list of allowed IP addresses. An example of how this is implemented would be the following:

1. In the **Deny IP's** field enter **172.20.1.20-172.20.1.30**.
2. In the **Allow IP's** field enter **172.20.1.22, 172.20.1.33**.

Access to the broadcast will be forbidden for the entire subset of addresses - **172.20.1.20-30**.

The set of users must have a fixed IP address or a range of IP addresses through which they connect to the internet. Individual computers may have dynamic server-assigned addresses but as long as they use a gateway with a static address to access the internet, this feature can be configured

IP authentication is primarily about convenience, rather than extra security. The level of security is comparable with that of a password-based authentication. Bear in mind that anyone who has access to a computer within the specified range will be able to access the broadcast without having to provide log in credentials. Also it is probably not possible to restrict access to a single computer since in most networks a number of computers share a single gateway to the internet.

The table below shows the fields used in configuring IP-based authentication for viewers.

Deny IP's	Enter individual IP addresses separated by a comma or a range of IP addresses that are denied access to the broadcast. To specify a range of addresses, use a hyphen (-). Example 1: **172.20.1.20, 172.20.1.32** Example 2: **172.20.1.1-100**
Allow IP's	Enter individual IP addresses separated by a comma or a subset of IP addresses that are granted access to the broadcast. To specify a range of addresses, use a hyphen (-).

11.4.3 Delete the Viewer Password

The viewer password can be deleted if viewers are not required to enter a password to access the broadcast.

1. Log into the Web admin interface.
2. Select **Viewer Access**. The password fields should be blank.
3. Select **Apply** without adding characters to the password fields. The password is deleted.

11.5 Upgrading the System Firmware

New firmware is released to fix known problems or to add new features. When available, new firmware versions can be obtained from Epiphan Support.

Installing new firmware can take several minutes. Once a firmware upgrade is started, the DVI Broadcaster DL cannot broadcast or record streams until the firmware upgrade is complete.

Note that no passwords are set in the new firmware. However when you upgrade the existing firmware, the administrator's password is the same as the operator's password.

11.5.1 Installing new firmware

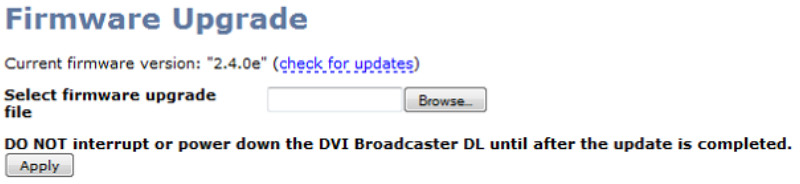
Do not interrupt or power down the DVI Broadcaster DL device during the firmware update.

1. Log into the Web admin interface.
2. **S**elect **Firmware Upgrade** from the main menu.
3. Click the **Check for updates** command. The system will indicate whether any updates are available**.** If updates are available**,** select **Browse** and then select the downloaded firmware file.
4. Select **Apply**. The firmware file is uploaded to the DVI Broadcaster DL. It then unpacks the firmware file, verifies the contents and then upgrades the firmware.
5. To complete the firmware upgrade you must reboot the DVI Broadcaster DL. Refer to the section, **Rebooting or Restarting** .

6. Log into the Web admin interface and confirm that the DVI Broadcaster DL is now running the new firmware version by selecting **Info** from the main menu and by viewing the firmware version.

Should the firmware update fail, restore to the default factory configuration. Refer to the section **Restoring the DVI Broadcaster DL Default Factory Configuration**.

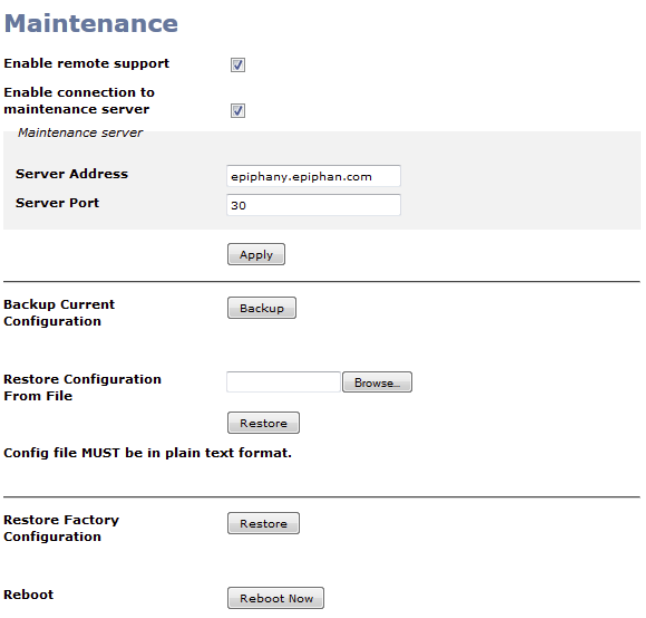
Figure 50 Firmware Upgrade


Firmware Upgrade
Current firmware version: "2.4.0e" (check for updates)
Select firmware upgrade file
Browse...
DO NOT interrupt or power down the DVI Broadcaster DL until after the update is completed.
Apply

11.6 Maintenance Controls

From the Web admin interface's main menu, select **Maintenance** to perform operations such as restoring the factory configuration, and rebooting the DVI Broadcaster DL.

Figure 51 Maintenance Options



11.6.1 Restoring the DVI Broadcaster DL Default Factory Configuration

Select **Restore** beside Restore Factory Configuration to reset the stream and frame grabber settings back to the default factory configuration. The default factory configuration is the configuration that the DVI Broadcaster DL had when it was received from Epiphan. It can be useful to return the DVI Broadcaster DL to this configuration if a number of configuration changes have been made that need to be reversed.

Note that restoring default factory configuration also restores default network configuration (DHCP settings are enabled by default).

Pressing the Reset button on the DVI Broadcaster DL will also perform a reset to the default factory configuration. See the section, **System Hardware Features**, for information on the location of the reset button and the proper steps that need to be followed to perform a hardware based factory reset.

11.6.2 Rebooting or Restarting DVI Broadcaster DL

Many DVI Broadcaster DL configuration changes require you to reboot the DVI Broadcaster DL in order to have these changes come into effect, the following outlines the steps to reboot the DVI Broadcaster DL.

11.6.2.1 To reboot or restart the DVI Broadcaster DL

1. Log into the Web admin interface.
2. Select **Maintenance**.
3. Beside **Reboot** select **Reboot now**.

The reboot process is not lengthy and once completed, the DVI Broadcaster DL will resume normal operation.

11.6.3 Backing up Current Configuration

Use this functionality to ensure that you have a backup version of your current configuration on your local machine. It is helpful, for example, when you need to set up multiple devices using the same parameters. Note that you should not store any passwords in the configuration file since it has plain text format and all passwords will be visible.

1. Log into the Web admin interface.
2. Select **Maintenance**.
3. Beside **Backup current configuration** select **Backup**.

11.6.4 Restoring Configuration from File

1. Select **Maintenance**.
2. Click Browse near **Restore configuration from file** and select the configuration file.
3. Click Restore.

11.6.5 Shutting down the DVI Broadcaster DL

To shut down DVI Broadcaster DL you need to disconnect power. It is not possible to shut down the device from the Web Interface.

11.7 DVI Broadcaster DL System Information

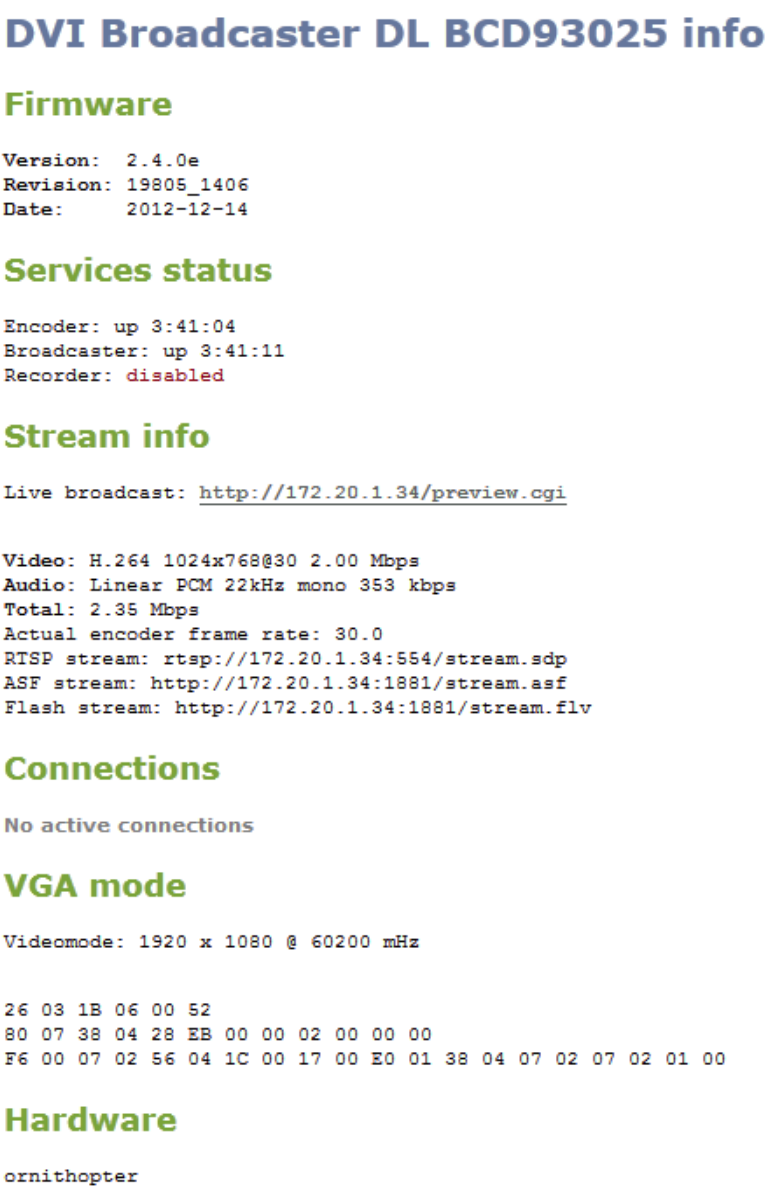
To display the following system information, select **Info** from the Web admin interface's main menu:

1. The current firmware version, revision and date.
2. The services status.

3. The information about the broadcast characteristics, encoder's frame rate and the IP addresses of the broadcast in all possible formats. Please refer to **Using the Web Admin Interface's Info Page**.
4. Active connections.
5. Resolution of the connected video source and other VGA mode information.
6. The hardware platform information.

This page is also displayed when you first log into the Web admin interface.

Figure 52 DVI Broadcaster DL Information



DVI Broadcaster DL BCD93025 info

Firmware

Version: 2.4.0e
Revision: 19805_1406
Date: 2012-12-14

Services status

Encoder: up 3:41:04
Broadcaster: up 3:41:11
Recorder: disabled

Stream info

Live broadcast: http://172.20.1.34/preview.cgi

Video: H.264 1024x768@30 2.00 Mbps
Audio: Linear PCM 22kHz mono 353 kbps
Total: 2.35 Mbps
Actual encoder frame rate: 30.0
RTSP stream: rtsp://172.20.1.34:554/stream.sdp
ASF stream: http://172.20.1.34:1881/stream.asf
Flash stream: http://172.20.1.34:1881/stream.flv

Connections

No active connections

VGA mode

Videomode: 1920 x 1080 @ 60200 mHz

26 03 1B 06 00 52
80 07 38 04 28 EB 00 00 02 00 00 00
F6 00 07 02 56 04 1C 00 17 00 E0 01 38 04 07 02 07 02 01 00

Hardware

ornithopter

12 Serial Port Configuring

The DVI Broadcaster DL can be integrated with control equipment that uses an RS-232 interface. This RS-232 interface is used to trigger the device to perform various actions by sending a command over the RS-232 connection, refer to the RS-232 Commands chapter for more information about these commands.

To connect your control equipment to the DVI Broadcaster DL, use a standard RS-232 null-modem cable. Then an RS-232 serial adapter is connected to the RS-232 null-modem cable before inserting it into one of the two USB ports on the DVI Broadcaster DL.

The standard DVI Broadcaster DL package does not include an RS-232 serial adapter but one can be purchased from Epiphan as an optional accessory.

Flow control is the only configurable item for this feature. This is done by navigating to the Serial Port section of the Web admin interface.

Table 14 ***Configuring the Serial Port Feature***

Flow control	Flow control means the ability to slow down the flow of bytes in a wire. For serial ports this means the ability to stop and then restart the flow without any loss of bytes. Specify by what means this control will be performed: • **Hardware** • **Software** • **None**

Figure 53 Configuring the Serial Port Feature

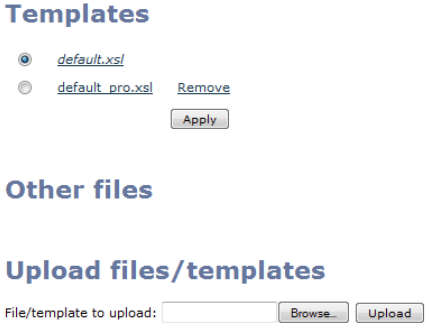
13 Customizing Presentation and Web Content

This feature allows the customizing of the viewer's Web browser's display of the broadcast. For example, the event's name, company logos and other pertinent data can be displayed to the viewer. Note that this feature affects only viewers who are connecting to the broadcast via Live View (please refer to **Using the Web Admin Interface's Live View Feature**).

To use this option, select **Branding** from the Web admin interface's main menu.

To customize the design you need to create an .xsl file using XML document formatting. The creation of this file is beyond the scope of this document.

Figure 54 Customizing Web Content



The table below outlines how to select and upload the necessary files to customize the viewing browser.

Table 15 Web Content Configurable Options

Templates	Available template files are displayed. To select a template, click a radio button near its name. Then click **Apply**.
Other files	Files that were uploaded and used during template creation are displayed.
Upload files/templates	Browse to the template or file you need to upload and click Upload.

14 Configuring Remote Support

The DVI Broadcaster DL uses remote support settings to communicate with the Epiphan maintenance server. When enabled, communicating with the maintenance server allows Epiphan to review the device configuration, firmware version, and other basic operating parameters. If you contact Epiphan Support for help with the DVI Broadcaster DL, the support team can use this maintenance information to help remotely troubleshoot the problem.

The DVI Broadcaster DL device does not send private information to the Epiphan maintenance server, just basic operation and configuration information. The amount of traffic sent to the Epiphan maintenance server is small and should not affect the network or Internet throughput.

By default, communication with the Epiphan maintenance server uses TCP port 30.

The default address of the Epiphan maintenance server is **epiphany.epiphan.com**.

The DVI Broadcaster DL must be able to find a DNS server to resolve the default address and then must be able to connect to this address on the Internet using TCP port 30. If the DVI Broadcaster DL's network settings are set to use DHCP, it gets the address of the DNS server from the DHCP server. If network settings are set to use a static IP address, the IP address of the DNS server must be entered. This IP address can be retrieved from your network administrator.

If you have a firewall or some other device protecting the network from the Internet and you would like to enable remote support, the configuration of this device may have to be changed for the DVI Broadcaster DL to connect to the Epiphan maintenance server. Contact your network administrator for assistance.

Remote support is enabled by default. Use the **Maintenance** section in the Web admin interface to access the remote support settings and refer to the following diagram and table for more details on how to configure this feature.

Figure 55 Remote Support Configuration

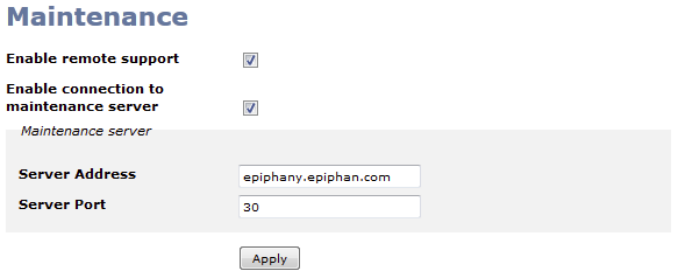


Table 16 ***Remote Configuration Options***

Enable Remote Support	Allow Epiphan Support to log into the DVI Broadcaster DL with special access privileges to troubleshoot problems.
Enable connection to maintenance server	The DVI Broadcaster DL establishes an outgoing TCP connection to the Epiphan maintenance server using TCP port 30. Using this connection, the device sends information to the Epiphan maintenance server and Epiphan Support can use this connection to remotely log into the device.
Server Address	The address of the Epiphan maintenance server. This address is usually **epiphany.epiphan.com**. Only change this address if required, and only if recommended by Epiphan Support. For example, this might be changed to a numeric IP address if the DVI Broadcaster DL cannot connect to a DNS server.
Server Port	The Epiphan maintenance server's port number.

You can enable and disable remote support and the connection to the maintenance server independently.
The following table describes the results of different configurations:

Table 17 ***Different Results by enabling/disabling Remote Support and Connection to the Maintenance Server***

Enable Remote Support	Enable Connection to Maintenance Server	Result
Yes	Yes	The DVI Broadcaster DL connects to the Epiphan maintenance server. If required, Epiphan Support can remotely connect to the device with special access privileges.
No	Yes	The DVI Broadcaster DL connects to the Epiphan maintenance server. Epiphan Support can remotely connect to the Web admin interface with the same access privileges as an administrator.
Yes	No	The DVI Broadcaster DL does not connect to the Epiphan maintenance server. If required, Epiphan Support can remotely connect to the device with special access privileges. Contact Epiphan Support for assistance.

Please contact your network security administrator to review your security settings for the DVI Broadcaster DL.

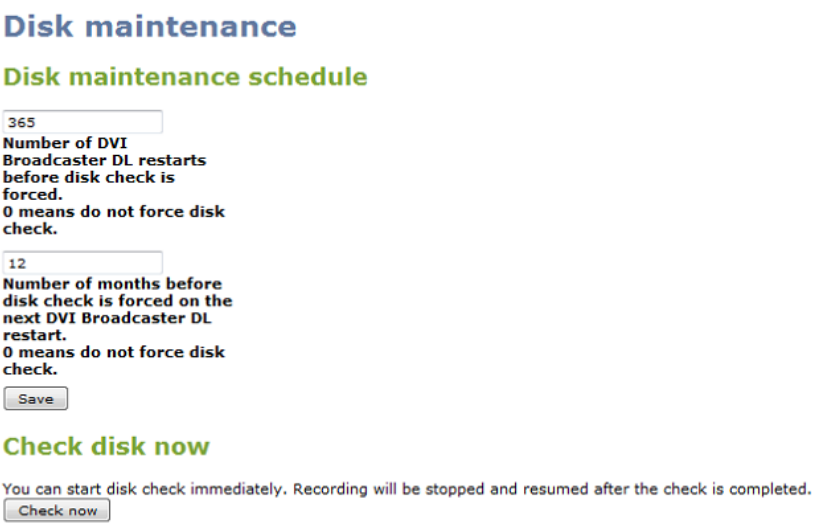
15 Disk Check

A disk maintenance schedule can be set up for checking the DVI Broadcaster DL's hard disk for errors. The hard disk maintenance schedule includes running a disk check after either a configured number of device restarts or after a configured number of months of operation. This is configured on the Disk Check page which is opened by selecting **Disk Check** from the Web admin interface's main menu.

This page allows the number of the Recorder restarts before a disk check is to be performed and the number of months to lapse prior to a disk check to be configured. The system will trigger a disk check based on these values and based on whichever event occurs first. The actual disk check process will be run the next time the DVI Broadcaster DL restarts. The disk check occurs during system startup and can cause a lengthy delay in starting up the device.

Alternatively on the same page, select **Check disk now** to immediately perform the disk check. Clicking this button causes the device to stop recording and to check the disk immediately. The disk check process can take a few minutes. The DVI Broadcaster DL automatically resumes recording after the disk check is complete. Results of the disk check are not displayed unless errors that cannot be corrected are found.

Figure 56 Configuring the Disk Maintenance Schedule


Disk maintenance
Disk maintenance schedule
365
Number of DVI Broadcaster DL restarts before disk check is forced.
0 means do not force disk check.
12
Number of months before disk check is forced on the next DVI Broadcaster DL restart.
0 means do not force disk check.
Save
Check disk now
You can start disk check immediately. Recording will be stopped and resumed after the check is completed.
Check now

16 Disk Status Information

In the **Disk status** section of the Web admin interface's main menu, the total amount of space available on the DVI Broadcaster DL's solid state memory in GB is listed. Additionally, the used and available space in GB, and the amount used as a percentage of the total amount of space on the disk is displayed for quick reference.

If the DVI Broadcaster DL is running low on disk space the administrator can delete files. The administrator can also configure automatic file uploads to keep the DVI Broadcaster DL from running out of disk space. The DVI Broadcaster DL stops recording if there is less disk space available than the amount required saving a broadcast file.

17 Configuring using a Third-Party Application

The DVI Broadcaster DL can be configured and managed with the third-party applications or with a script that sends commands to the DVI Broadcaster DL as URLs. Please contact Epiphan for the most recent updates to the API.

This chapter describes:

- Serial port configuration;
- RS-232 commands;
- Syntax for HTTP API Commands;
- Keys for HTTP API Commands;
- and finally provides some examples.

17.1 Serial Port Configuration

The System's serial port configuration has the following settings:

Parameter	Value
Speed	19200 bps
Data bits	8
Parity	None
Stop bits	1
Flow control	Hardware

17.2 RS-232 Commands

The DVI Broadcaster DL implements an RS-232 interface allowing for the easy integration with existing control room and board room equipment.
Some of the commands require channel name as an argument. Channel name should be separated from the command name by a period – ".". Either a channel name or a channel index can be specified. An empty channel name can be provided for some commands. In this case this setting is interpreted as all channels. If more than one channel has the same name the command will apply only to one channel, so the channel index should be used instead.

Table 18 ***Serial Interface commands and Status Report commands and description***

STOP.<channel>	Stop recording for the channel by setting rec_enabled to "". This has the same effect as *SET.<channel>.rec_enabled="" SAVECFG*.
STOP	Stop recording for all channels
START.<channel>	Start recording for the channel by setting rec_enabled to "on". This has the same effect as *SET.<channel>.rec_enabled=on SAVECFG*.
START	Start recording on all channels
SNAPSHOT.<channel>	Take snapshot on the specified channel (must be MJPEG)
SNAPSHOT	Take snapshot on all channels (must be MJPEG)
GET.<channel>.<key>	Get value of a broadcasting parameter <key>. Please refer to section Broadcasting Setup Keys for details.
SET.<channel>.<key>=<value>	Set value of a broadcasting parameter. Parameter values containing spaces must be enclosed in quotation marks (either single or double). New values might not take effect immediately and will be lost after the reboot unless SAVECFG command is issued later.
SAVECFG	Save parameters values modified by SET command.
STATUS.<channel>	Report status of recording service for the channel. Status values are: "Running", "Stopped", "Uninitialized ".
STATUS	Report status of recording service for all channels.
FREESPACE	Report free space on the data partition, in bytes.
RECTIME.<channel>	Report elapsed time for the current file being recorded.
RECTIME	Report elapsed time for the current recording file for all channels.

If any of the START commands are given while a recording is already in progress, the current recording will be stopped and a recording with the new settings will be started. The DVI Broadcaster DL periodically reports its status back using the following messages:

Status Line Value

RECTL STATUS {UP <time>|DOWN
<time>|UNKNOWN}

Status of the recording

RECTL MICVOLUME <0-100> Level of line-in amplification (percents)
RECTL PCMVOLUME <0-100> Level of line-out amplification (percents)

Each status line is terminated with an LF (ASCII code 10) character.

17.3 Syntax for HTTP API Commands

Use the following syntax to get configuration settings:

`http://<address>/admin/get_params.cgi?key`

Use the following syntax to set or change the configuration:

`http://<address>/admin/set_params.cgi?key=value`

In this example **<address>** is the IP address or name you use to connect to the System admin interface.

E.g., if you log into the DVI Broadcaster DL's Web admin interface using http://192.30.23.45/admin, then <address> would be 192.30.23.45.

Key is the name of the object of the DVI Broadcaster DL to be viewed or changed. See the next section for more information on the valid values for **key**.

V**alue** is the value to be set. Some values include spaces, for example, the frame size can be 1024 x 768. Use %20 for spaces, for example: framesize=1024%20x%201068

You can include multiple <key>or <key>=<value>statements in one URL. Separate the statements with &.
For example:
• To get the product name and firmware version:

http://<address>/admin/get_params.cgi?product_name&firmware_version
• To set the stream type to ASF and bit rate to 256000:
http://<address>/admin/set_params.cgi?streamtype=2&vbitrate=256K

For third party applications like wget, you should always include the admin username and password to change the DVI Broadcaster DL configuration. The syntax for using wget to enter URLs is:

```
wget --http-user=admin --http-passwd="<passwd>" http://<address>/admin/get_params.cgi?<key>[&<key>]..."
wget --http-user=admin --http-passwd="<passwd>" http://<address>/admin/set_params.cgi?<key>=<value>[&<key>=<value>]...
```

17.4 Keys for HTTP API Commands

This section lists and describes all of the keys that can be used in HTTP API commands to view or change the DVI Broadcaster DL configuration. These keys are broken into the following types:

- Device Info Keys
- Broadcasting Setup Keys
- ASF Encoder Keys
- RTP Unicast Keys

17.5 Device Info Keys

These keys are used for getting information about the device.

Table 19 Device Information Keys

Key	Description
vendor	Name of a vendor. The value is always "Epiphan Systems Inc.”
product name	Name of a product.
firmware_version	Firmware version.
mac_address	MAC address.

17.6 Broadcasting Setup Keys

These keys are used for getting or setting the broadcasting setup.

Table 20 Broadcasting Setup Keys

Key	Description
framesize	Get or change the frame size in pixels, for example 1024 x 768. Use %20 for spaces.
htmlrefresh	Get or change the Flash/MJPEG webpage page refresh time in seconds. The range is 0 to inf (infinite). 0 means that page will not refresh.
streamport	Get or change the stream port number. The range is 1000 to 65535. You cannot use port 5557 because this port is used for network discovery.
streamtype	Get or change the stream type: • 0 - Flash • 1 - Flash+H.264 • 2 - ASF • 3 - ASF+H.264 • 4 - MJPEG • 5 – RTSP
vbitrate	Get or change the video bit rate in kbit/s, for example vbitrate=65536. You can use short forms such as vbitrate=64K and vbitrate=1M.
bcast_disabled	Possible values are 'on' or empty. Broadcasting will be disabled if the value is 'on'.
audio	Possible values are 'on' or empty. Enables broadcasting of audio signal.
usenosignal	Possible values are 'on' or empty. Displays “No signal” image if the signal is off.
vbufmode	Use this key to define compression level of the broadcast. E.g., in the Strong mode the broadcast parameter strictly correspond to the specified bitrate. Select the level: • Relaxed • Balanced • Strong
fastvideo	Enables fast video.

	Possible values are 'on' or empty
timelabel	Enables time labeling functionality. Possible values: • 'none' • 'date' • 'hms' • 'date_hms' • 'hms_ms' • 'date_hms_ms'
vgopsize	Minimum interval between key frames.
fpslimit	Video frame rate limit.

17.7 ASF Encoder Keys

These keys are used for getting or setting ASF encoder settings. You can change ASF encoder settings when stream type is set to ASF stream.

Table 21 ASF Encoder Keys

Key	Description
title	Add a title for the video being broadcast. Use %20 for spaces.
author	Add the name of the author of the video being broadcast. Use %20 for spaces.
copyright	Add copyright information for the video being broadcast. Use %20 for spaces.
comment	Add a title for the video being broadcast. Use %20 for spaces.

17.8 RTP Unicast Keys

These keys are used for getting or setting RTP unicast settings. You can change these settings when stream type is set to RTP.

Table 22 RTP Unicast Keys

Key	Description
unicast_enabled	Enable RTP unicast. Possible values are 'on' or empty.
unicast_address	Get or change the unicast address.
unicast_aport	Get or change the unicast a port.
unicast_vport	Get or change the unicast v port.

17.9 Recorder Keys

These keys are used to enable or disable the recording of a broadcast.

Table 23 Recorder Keys

Key	Description
rec_enabled	Enables recording functionality. Possible values are 'on' or empty.

17.10 Examples

For a DVI Broadcaster DL device with an IP address of 192.30.23.45, and admin password of pass123, one can use wget to do the following:

- Enter the following command to view the broadcasting stream type and frame size:

  wget --http-user=admin --http-passwd=pass123 "http://192.30.23.45/admin/get_params.cgi?streamtype&framesize"

- Enter the following command to set the broadcasting stream type to ASF, add the title “DVI Broadcaster DL Stream”, and enable recording audio.

  wget --http-user=admin --http-passwd=pass123 "http://192.30.23.45/admin/set_params.cgi?streamtype=2 &title= DVI Broadcaster DL %20Stream&audio=on"

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The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.
In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.
The crossed-out wheeled bin symbol invites you to use those systems. If you need more information about collection, reuse and recycling systems, please contact your local or regional waste administration. You can also contact us for more information on the environmental performance of our products.

FCC & CE Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received, including interference that may cause undesired operation.

Marking by the symbol CE indicates compliance of this device with EMC directive of the European Community and meets or exceeds the following technical standard.

EN 55022 - Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

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19 Configuration Worksheet

Use this worksheet to keep necessary information about the DVI Broadcaster DL installation, settings etc.

Parameter (IP address, DNS server, SSID…)	Value

Notes:

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